FOUNDRY TRADE JOURNAL
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DECEMBER 8, 1960
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Single Copy, 1/-. By Post 1/4. Annual Subscription, Home 52/-, Abroad 60/- (Prepaid)

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IF YOU EMPLOY THE CO_2 PROCESS AND HAVE NOT ACHIEVED THE OPTIMUM IN RESPECT OF BENCH LIFE, BLOWING AND STRIPPING PROPERTIES, BREAKDOWN AND COST — YOU CANNOT AFFORD NOT TO EXAMINE

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Manufactured by

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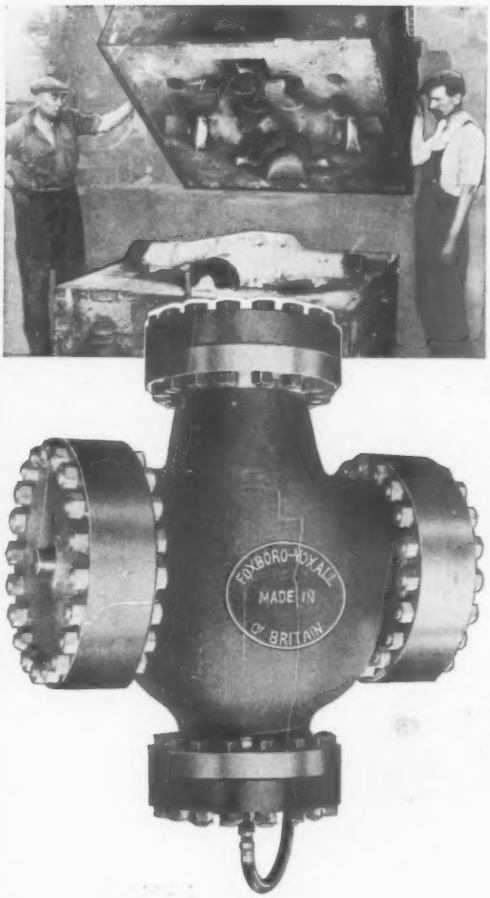
CORE OILS AND BINDERS

For every type of casting



Carbon steel valve casting, weight 3 tons, tested under pressure at 2,000 lbs per sq. in., for oil-installation. Photo of core and casting by courtesy of Messrs Lake & Elliot, Ltd., Iron and Steel Founders, Braintree, Essex.

★ CORE OILS
★ COLD SETTING OILS
★ CORE CREAMS
★ SEMI-SOLIDS
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ONE WALSALL FOUNDRY HAS PURCHASED 2,950 PAIRS OF 'TALBARD' MOULDING BOXES.
A LARGE NUMBER OF THESE BOXES WERE MADE WITH ONLY ·003" PIN CLEARANCE.
OUR CUSTOMERS ASSURE US OF THEIR COMPLETE SATISFACTION—

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TALBARD WORKS
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ASK FOR LEAFLET
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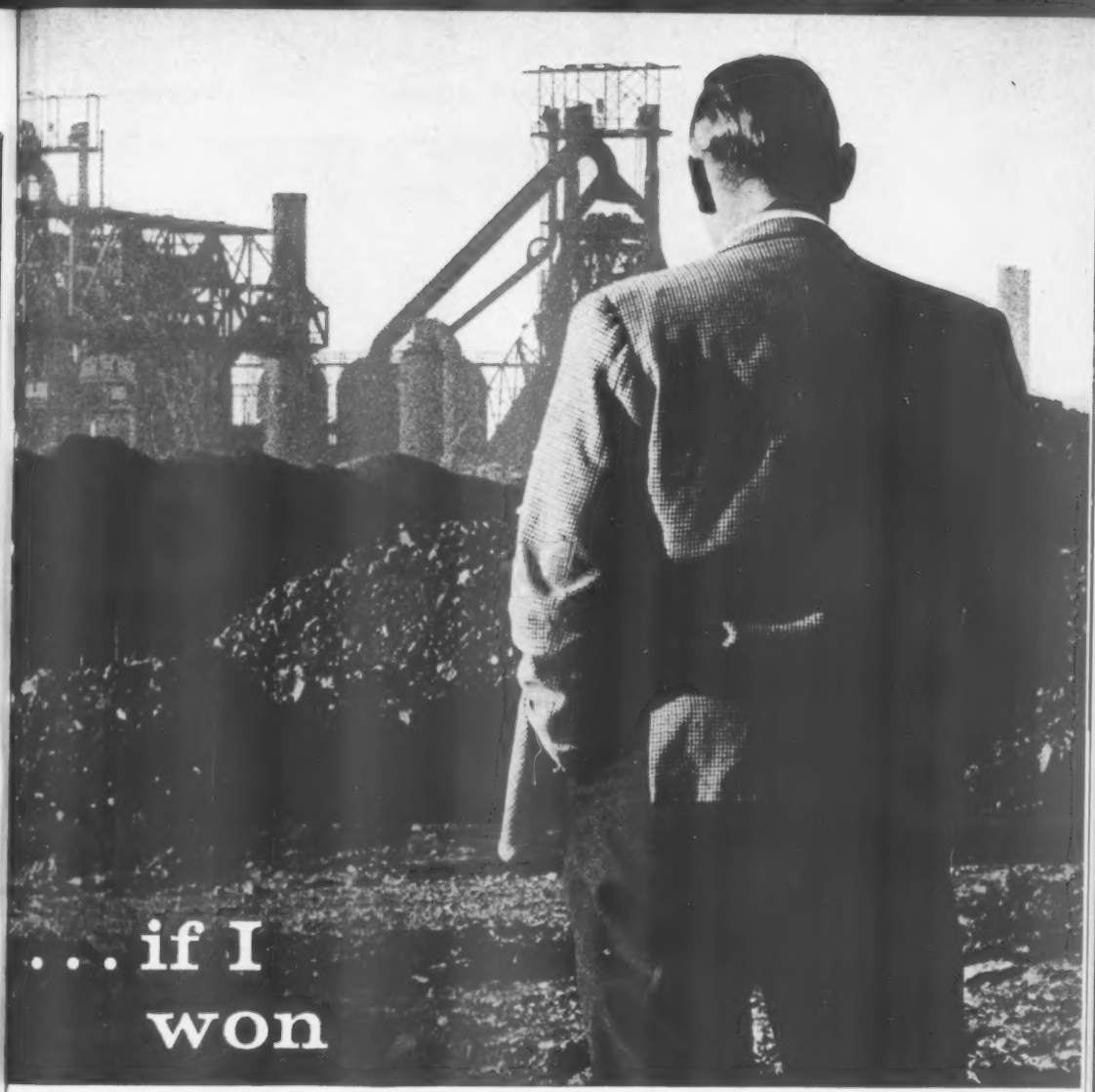

the pools

". . . and I might at that if a couple of teams I could mention were to buy themselves some decent centre forwards.

"Football is a funny game. One week a club is a world-beater and yet a few days later they can be licked to a frazzle by a team from a girls' school.

"Heaven help us if we carried on that sort of caper at AW. Customers don't want firms that are up one minute and down the next. When buyers come to a company with our reputation they expect—and get—a reliable performance. Fancy telling them that a load of pig wasn't up to specification because one of our furnacemen was off form!

"I reckon I'd get a coupon up every week if footballers were only half as consistent as the AW team."

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'Supplied to any specification at short notice'

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200 years experience in the working of metals has led to the high quality of **ROYDS** non ferrous ingots. They are subject to rigorous quality control at all stages of production and we are proud of the confidence our customers place in our products.

A representative will be pleased to discuss details fully with you.

The SHEFFIELD SMELTING COMPANY LIMITED

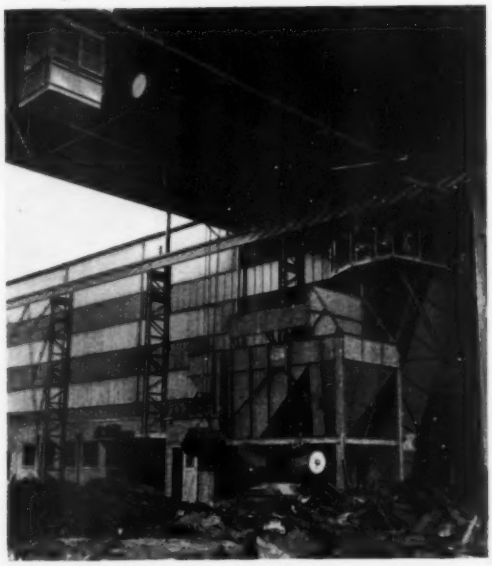
HEAD OFFICE AND WORKS: ROYDS MILL STREET, SHEFFIELD, 4.
ALSO AT LONDON AND BIRMINGHAM.

This Pneulec plant provides all facilities from knockout through sand cleaning and mixing to delivery over moulding units. We build similar plants in all capacities.

Built in England by

PNEULEC LIMITED, SMETHWICK, Nr. BIRMINGHAM

Illustration (reproduced by courtesy of Messrs. BILSTON FOUNDRIES Ltd.) is similar to the one described below



A Roper INSTALLATION will reduce your labour force

One man operation—resulting in real economy of labour and real efficiency too because the human element is reduced to a single degree. With Roper Automatic Charging Cycle Installation the Crane Operator does more than operate a Crane . . . by push-button he makes up the Metallics Charge in Weigh Hopper, controls the sequence of delivering the complete charge via Drop Bottom Bucket Charger into Cupolas in a 17 ton per hour capacity furnace, and can control the Coke and Stone feed to Weigh Hopper and record Charge weights.

The Roper Automatic Charging Cycle Installation can also incorporate other modern features such as Slag Granulation, Wet Arresters, Water Cooled Melting Zones, etc., etc.

Operation **Roper** *is operation of economy and efficiency*

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FOUNDRY EQUIPMENT ENGINEERS, KEIGHLEY, YORKSHIRE

Tel. : Keighley 4215/6 *Grams : "Climax" Keighley*

NEWSTAD Continuous Core Drying Stoves

Photo by courtesy H. J. Hall Ltd., Dartford, Kent.

Newstad Continuous Core Stoves with our well known recirculation system gives reduced drying times, low fuel consumption, better drying and closer temperature control.

Vertical stoves with single or multi-loop conveyors, can be supplied with cooling chamber, and automatic loading and unloading equipment.

Horizontal stoves can be loaded at the coremakers bench, and unloaded where the dried cores are required, eliminating the need for handling hot coreplates.

Oil, Gas or Coke Fired.

MODERN FURNACES and STOVES LIMITED

Builders of INDUSTRIAL FURNACES

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COMMONWEALTH AGENTS

Forest Engineering (PTY) Ltd.,
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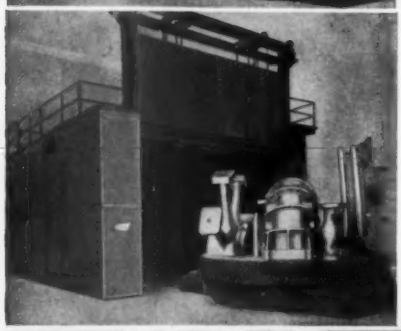
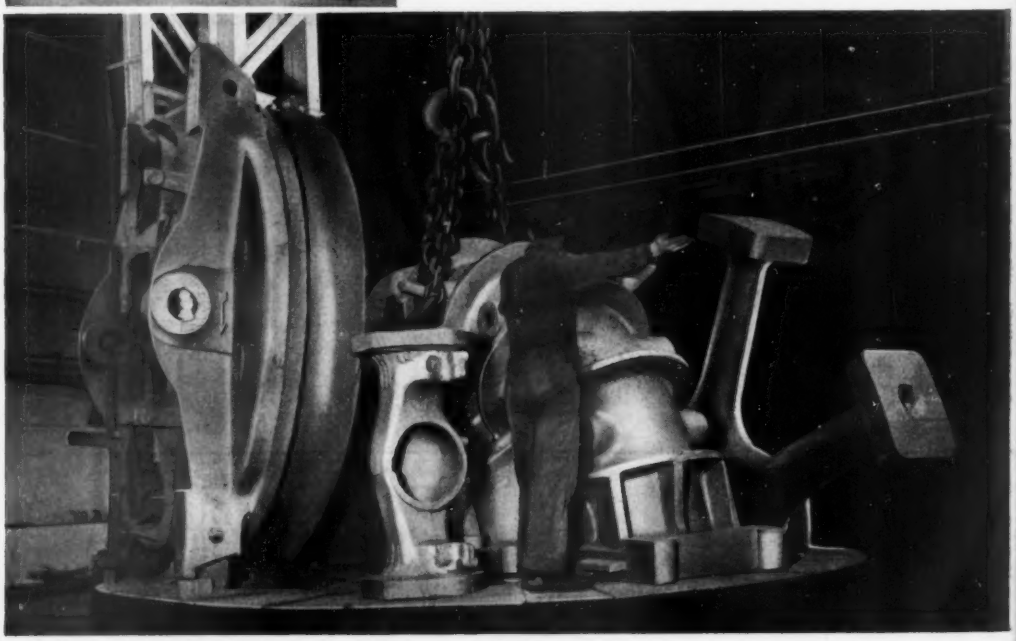


The World's Largest Mechanical

Shot Blast Room Plant

The Tilghman's Wheelabrator Room Plant shown in the accompanying illustrations is 30ft. by 25ft. by 16ft. high, and is installed at Messrs. F. H. Lloyd and Co. Ltd., Wednesbury. This plant, which is fitted with five Wheelabrator units, handles the production from two large bays, the components being loaded on to a bogie equipped with a circular table. Rotating and oscillating motions are provided to the bogie during the cleaning cycle, ensuring maximum blast coverage.



TILGHMAN'S LIMITED BROADHEATH ALTRINCHAM CHESHIRE

LONDON OFFICE: 1 Chester Street, S.W.1. A member of the Staveley Coal and Iron Co. Ltd. Group

AGENTS: MIDLANDS: R. J. Richardson & Sons Ltd., Commercial Street, Birmingham, 1.
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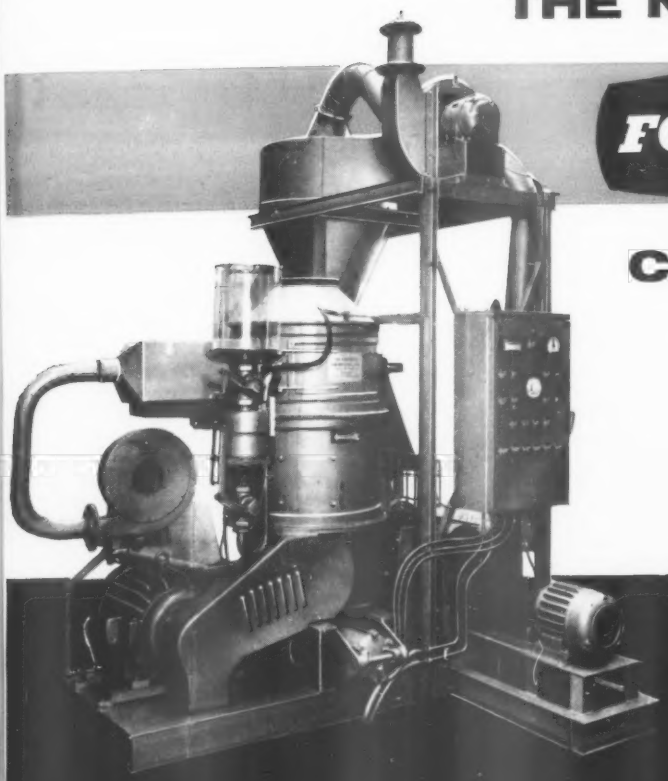
THE NEW



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COMPACT COATER

Held its debut at the Milan Exhibition
7th to 16th OCTOBER, 1960

The FORDATH Type 150 Compact Shell Sand Coating Unit

Dramatic new features include:

- Built-in pneumatic sand loader (and sand pre-heater)
- Integral electric air heater
- Integral time-cycle control panel
- New design automatic resin injector 'Compact' construction eliminating installation work.

Capacity Rating:

Average rating on basis of normal grading of sand and 4% resin

- Batch: 150 lb. (68 kg) maximum
- Output Capacity: 600-800 lb. (280-370 kg) per hour.
- Normal Output 1½-2 tons per 8-hour working.

thus FORDATH BRING SHELL SAND COATING WITHIN THE REACH OF THE SMALLER USERS FOR THEIR SHELL MOULD AND SHELL CORE OPERATION

particularly when FORDATH Liquid Phenolic resins are used

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THE FORDATH ENGINEERING CO. LTD., BRANDON WAY, WEST BROMWICH, STAFFS.
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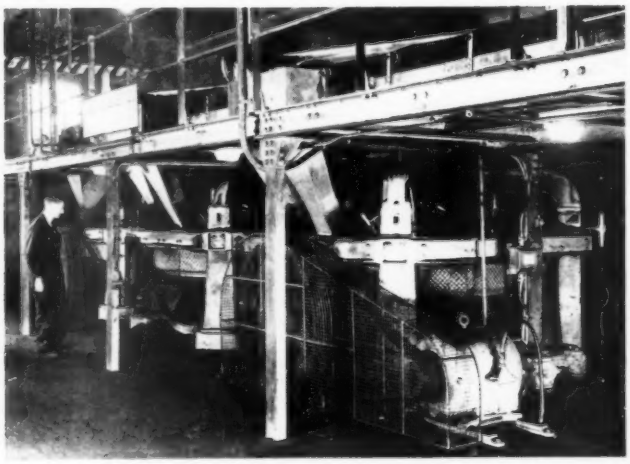
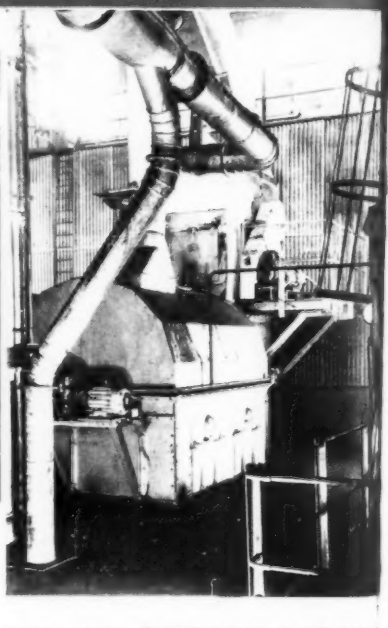
LEY'S MALLEABLE CASTINGS COMPANY LIMITED

SPECIFY FE PLANT

FOR THEIR NEW DERBY FOUNDRY



THREE S.B.3 SAND MILLS PROVIDE A CONTINUOUS SUPPLY OF HIGH BOND STRENGTH MOULDING SAND (MAX. CAP. 30 T.P.H. EACH)



8'0" × 6'0" ROTARY SCREEN ENSURES "CLEAN SAND" FOR MILLS

OVERSEAS COMPANIES

FOUNDRY EQUIPMENT (AUSTRALIA) PTY. LTD., Elizabeth, S. Australia

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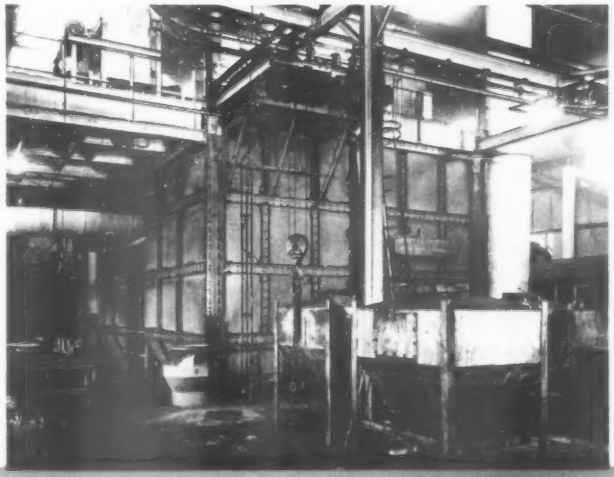
F. E. (SOUTH AFRICA) (PTY.) LTD. Johannesburg, S. Africa

"FOUNDRY EQUIPMENT" COMERCIAL ESPAÑOLA, S.A. Madrid, Spain

GENERAL VIEW OF SAND HANDLING AND DISTRIBUTION SYSTEM SHOWING TWIN OVERHEAD CONVEYORS FITTED WITH AUTOMATIC AND ELECTRONIC PLOUGH SYSTEM—ELIMINATING *"THE MAN OVERHEAD"*.



VIEW OF PART OF TWIN 125 TON CAPACITY SAND STORAGE HOPPERS EACH FITTED WITH FOUR 36" WIDE × 13'3" CENTRES FEEDER BELTS FOR CONTROLLED SAND FEED TO MILLS

FOUNDRY EQUIPMENT LTD.

LEIGHTON BUZZARD, BEDFORDSHIRE, ENGLAND.

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FOR FOUNDRY EFFICIENCY

TELEPHONE:
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TELEGRAMS:
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FOXBORO

Foundry Instrumentation

Weigh all the air

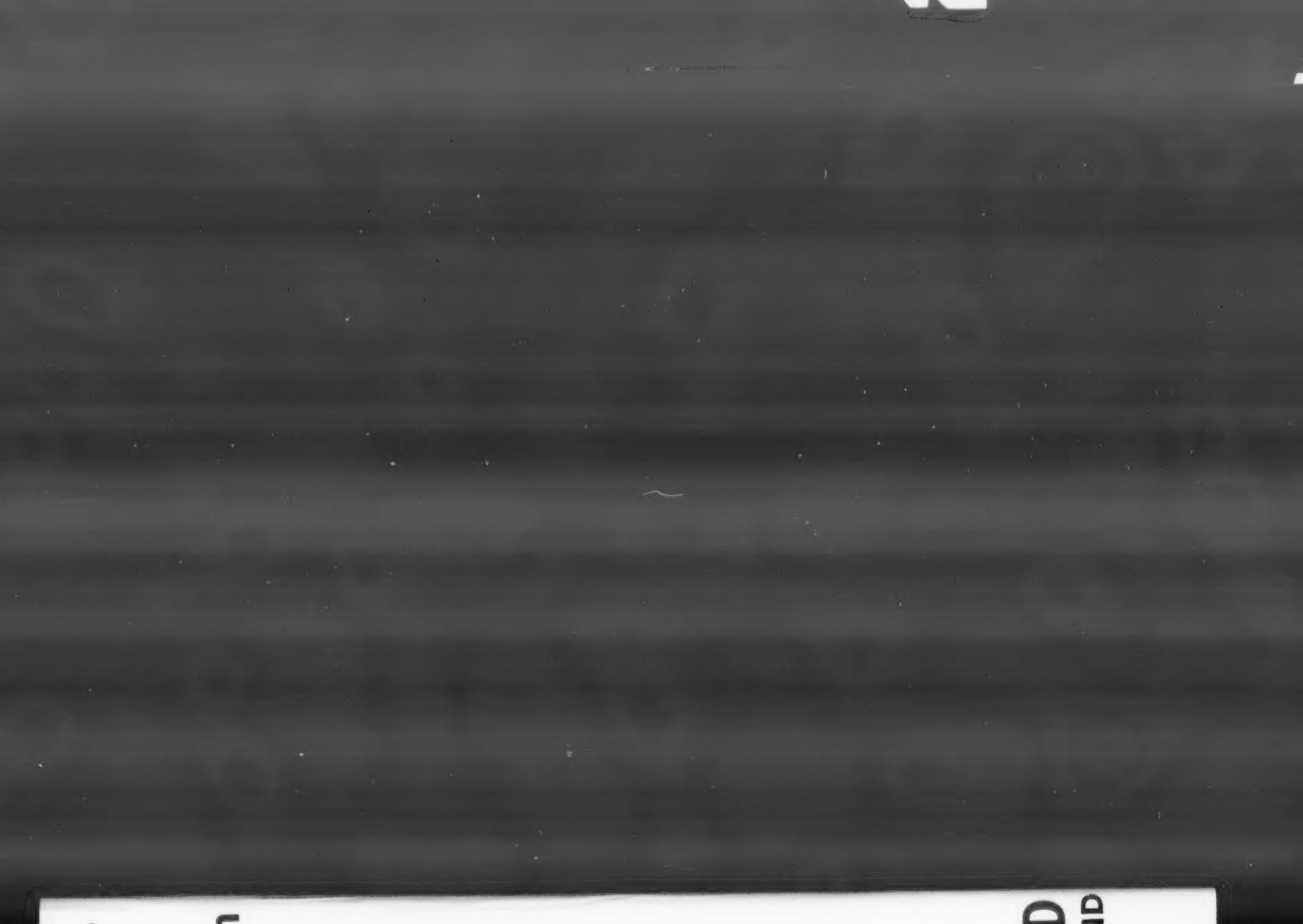
THE FOXBORO AIR WEIGHT CONTROL SYSTEM is specially developed to provide the Foundry Industry with Uniform Cupola Control. This completely Automatic System controls the weight of Air delivered to the Cupola, reduces fuel consumption and makes possible :—

UNIFORM HEATING
BETTER POURING
HIGHER QUALITY CASTINGS

In addition, Foxboro Systems are available for measuring, recording or controlling — Pressure, Humidity, Dewpoint, Temperature and many other variables.

FOXBORO-YOXALL LIMITED

REDHILL • SURREY • ENGLAND

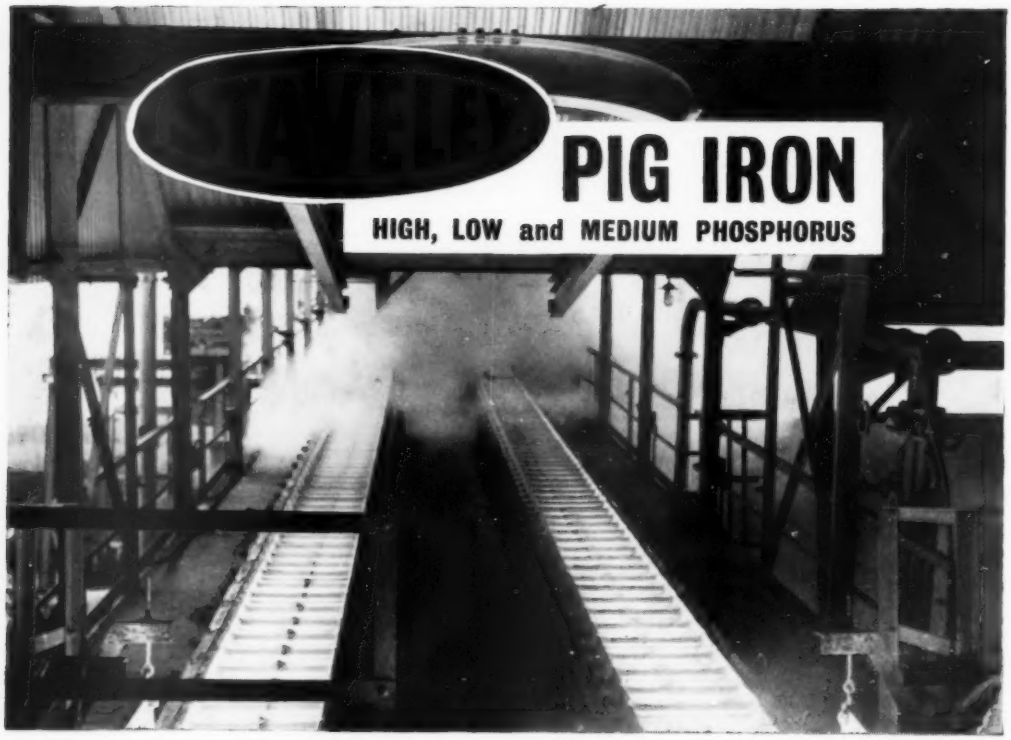


a c c u r a c y

Parting faces ground level and true. . . holes jig-drilled to ensure that pins and pin centres are perfectly aligned . . . all adding up to Accuracy.

Sterling

RLING FOUNDRY SPECIALTIES LTD. BEDFORD, ENGLAND



CAST IRON PIPES and JOINTS

MOULDING SAND and GANISTER

FOCUS ON 'FULBOND'

Nº5

Permeability

This property is of prime importance to all foundrymen especially those using a naturally bonded moulding sand. In synthetic sands Fulbond gives all the permeability that can be desired.

The initial permeability of natural sands is usually adequate for the first few moulds but soon begins to show a serious decline, resulting in a series of casting defects. Addition of new sand to increase permeability does not always have the desired effect, since after each casting cycle there is a progressive build-up of inert fines from the various decomposed minerals. It therefore becomes increasingly difficult to raise the permeability of a moulding sand even with large quantities of new natural sand.

Because so little Fulbond is required to regenerate moulding sand, the clay content can be kept at a minimum thus giving maximum permeability.

Moisture content has great influence on permeability. Natural sands require much more water than synthetic sands because of their relatively higher content of clay and fines. If the moisture can be kept down, permeability is automatically raised. Fulbond is most efficient at low to medium moisture, so it is clear how useful it is in controlling permeability.

For a copy of this Brochure please write to:

THE FULLERS' EARTH UNION LIMITED

Patteson Court, Nutfield Road, Redhill, Surrey

A member of The Laporte Group

Fourteenth century carving of a sow and litter in Worcester Cathedral. Photograph by Ruth Meyler & F. C Sillar

50 MILLION PIGS GO TO MARKET!

In the early days of the industrial revolution manufacturers frequently looked for familiar and easily recognisable descriptions of their products. To the countryman transplanted into industrial surroundings nothing was more familiar than a pig; a fact which is emphasised by carvings in scores of old churches depicting pigs suckling their litter, rooting for acorns and playing the bagpipes. (Apparently this last pastime was forsworn by pigs many years ago because of unpleasant associations between bagpipes and pigs bladders.) Consequently, when from Blast Furnaces was directed into long troughs from there into short and narrow troughs placed at angles, a resemblance to sows suckling their appen litter led to the description of 'pig iron'.

This series of advertisements illustrates some o 'ecclesiastical' pigs and emphasises the 50,000,000 'st pigs which Warner and Company have supplied to Foundries producing High Duty Castings.

WARNER WARNER WARNER

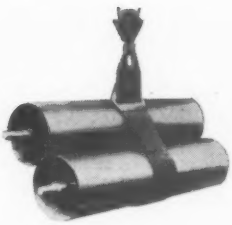
"Pioneers of *Refined Pigiron"*

KA

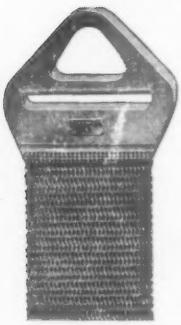
WARNER & CO. LTD., MIDDLESBROUGH

WEDCO

WIRE BELT SLINGS



THE SLING WITH 1,000 USES

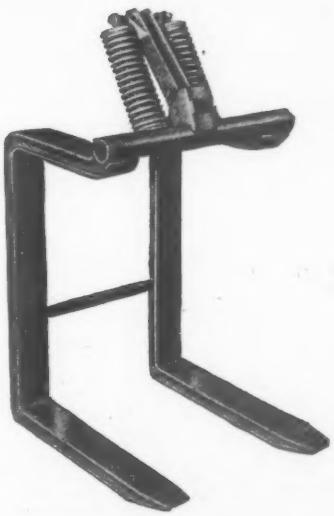


The " Wedco " Wire Belt Sling has the strength of steel combined with maximum flexibility and a wide bearing surface, giving exceptional load stability.
Made from thousands of strands of sturdy woven wire in a smooth transverse loop construction " Wedco " Wire Belt Slings cannot snap or tear. They are safer, easier to handle, faster to rig and will not whip, kink or tangle. In the field of mechanical handling this is something you should know more about, write us for the fullest details.

FELCO LIFTING APPLIANCES

" TEMPLEWOOD "

SPRING-BALANCED CRANE FORK



A new concept in mechanical handling—faster —safer and more manœuvrable. Replaces chains and ' C ' frames. Can be used in gangways too narrow for fork-lift trucks; this means an increase of storage space of up to 50 per cent. The ' Templewood " Crane Fork can be supplied of suitable capacity and dimensions for your particular load.

Write for full details to the Sole Concessionaires.

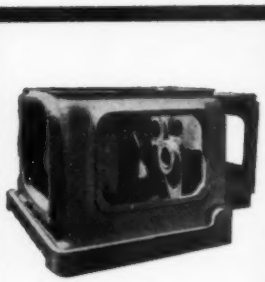
SOLE CONCESSIONAIRES:

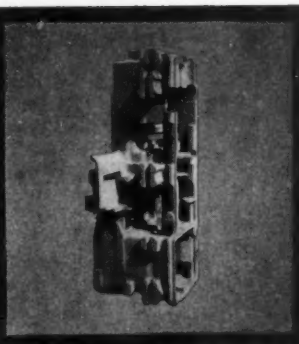
FELCO HOISTS LTD., 29 CROMWELL RD., SOUTH KENSINGTON, LONDON, S.W.7

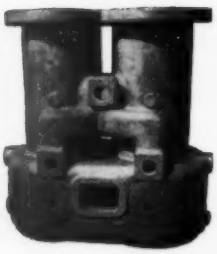
'Phone: KENSINGTON 7401 (3 lines) TELEX 24118 *'Grams: ' FELCOHOIST,' LONDON, TELEX*

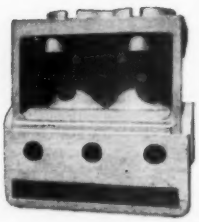
F8/60
D

All these intricate iron castings were produced by Robert Cort & Son Ltd., Reading, using CO_2 for core and mould hardening and Isopropyl Alcohol as the base for the flash dressing. You can get this sort of result simply and consistently in your foundry too.









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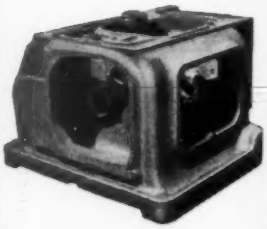
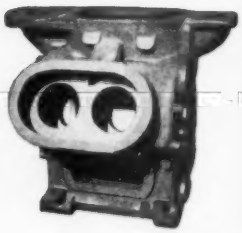
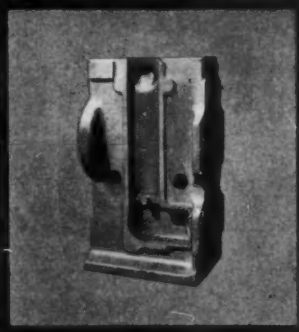


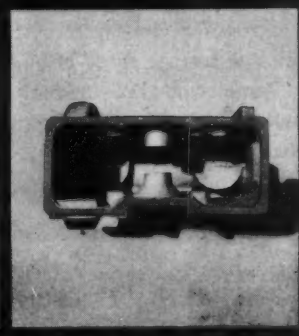




CARBON DIOXIDE
and
ISOPROPYL ALCOHOL

are available in all quantities and can be delivered by bulk road tanker.

Please address your enquiries to The Distillers Company Limited, Chemical Division, Devonshire House, Mayfair Place, Piccadilly, London W.1. Telephone : Mayfair 8867

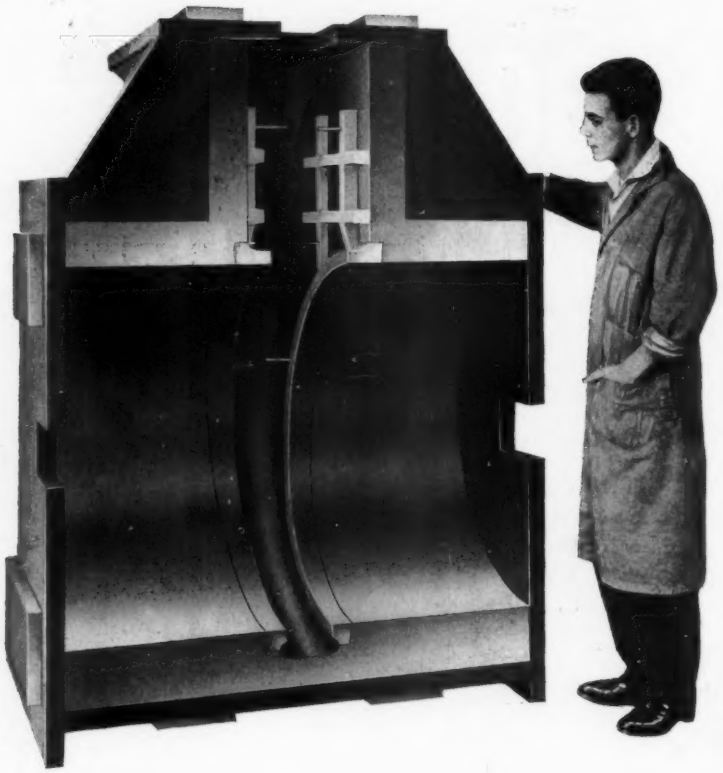


TA 2570

Come and see it in operation at the Battersea
Test Foundry, or ask our Technical Representative to call.

The Crucible Department THE MORGAN CRUCIBLE COMPANY LIMITED, NORTON WORKS, WOODBURY LANE, NORTON, WORCESTER.
Tel: Worcester 26691. Telegrams: Crucible, Worcester.

F52A



For man-size jobs

Crockett Lowe Ltd of Birmingham made this large corebox of Araldite epoxy casting resin. It provides an exact replica of the original, at a fraction of the cost of a duplicate pattern in wood and in a very short space of time. Araldite hardens at room temperatures without shrinkage, so that no dimensional allowances are necessary. The product is tough, not easily damaged, is unaffected by damp or changes of temperature, and needs no particular care in storage. Furthermore, modifications can be made economically if required, using the same Araldite mixture of resin, hardener and filler.

May we send you information on the use of Araldite in foundries?

Araldite **epoxy casting resins**

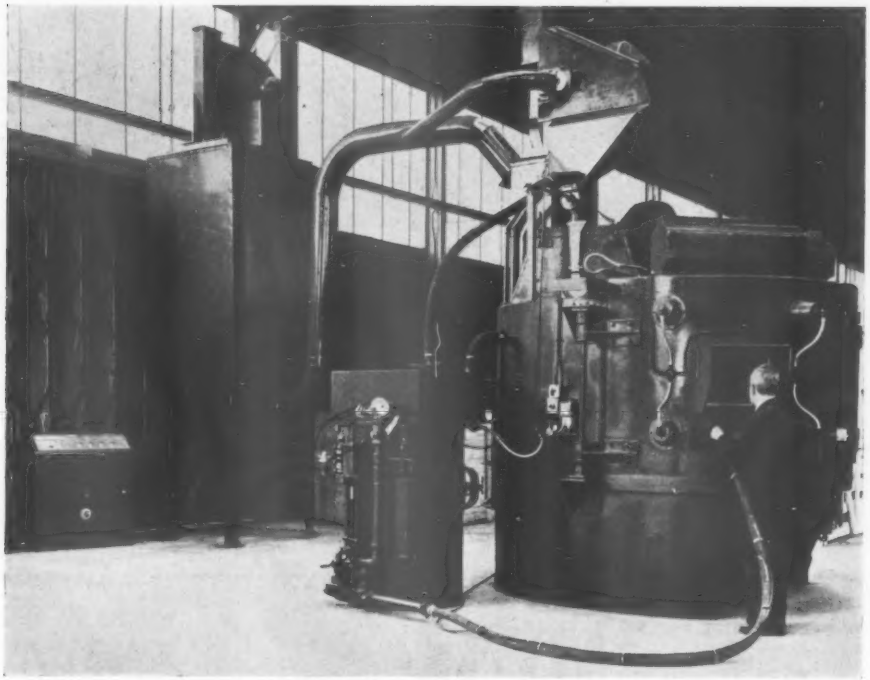
Araldite is a registered trade name

CIBA (A.R.L.) LTD, Duxford, Cambridge. Telephone: Sawston 2121

APS49

HEPBURN CONVEYOR Co. Ltd.

— WAKEFIELD —



6' 0" dia. 'LK' Table Shot Blast Machine complete with Touch-up Unit together with Dust Collector.

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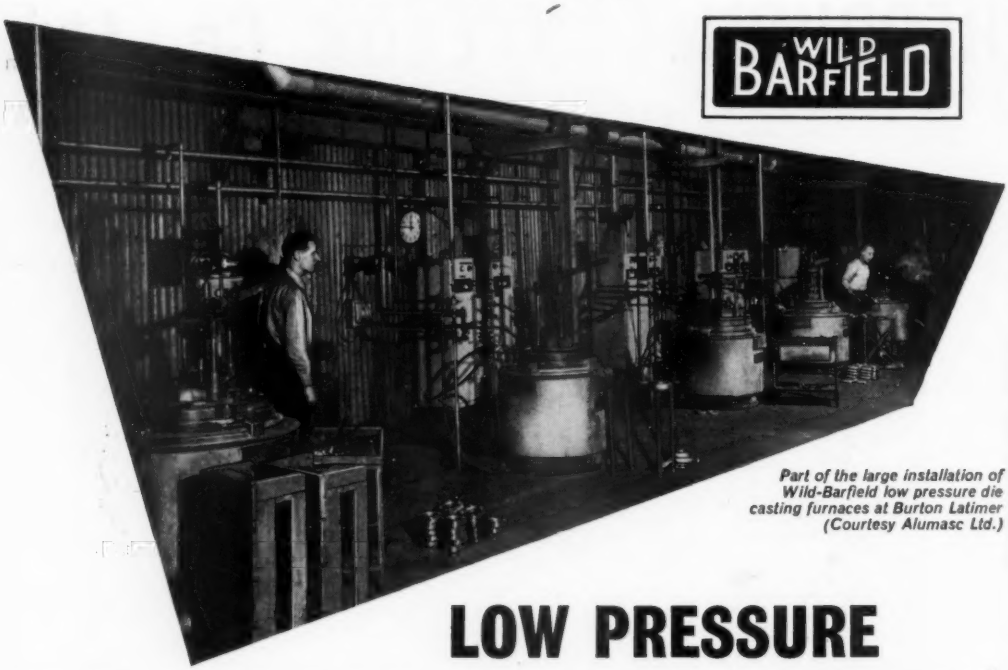

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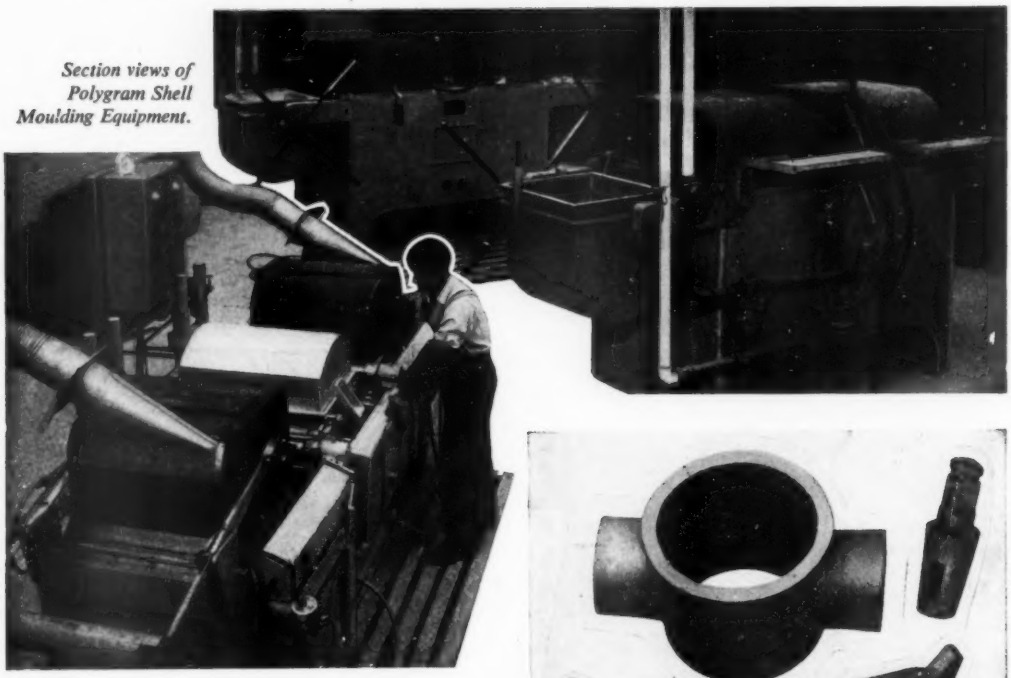

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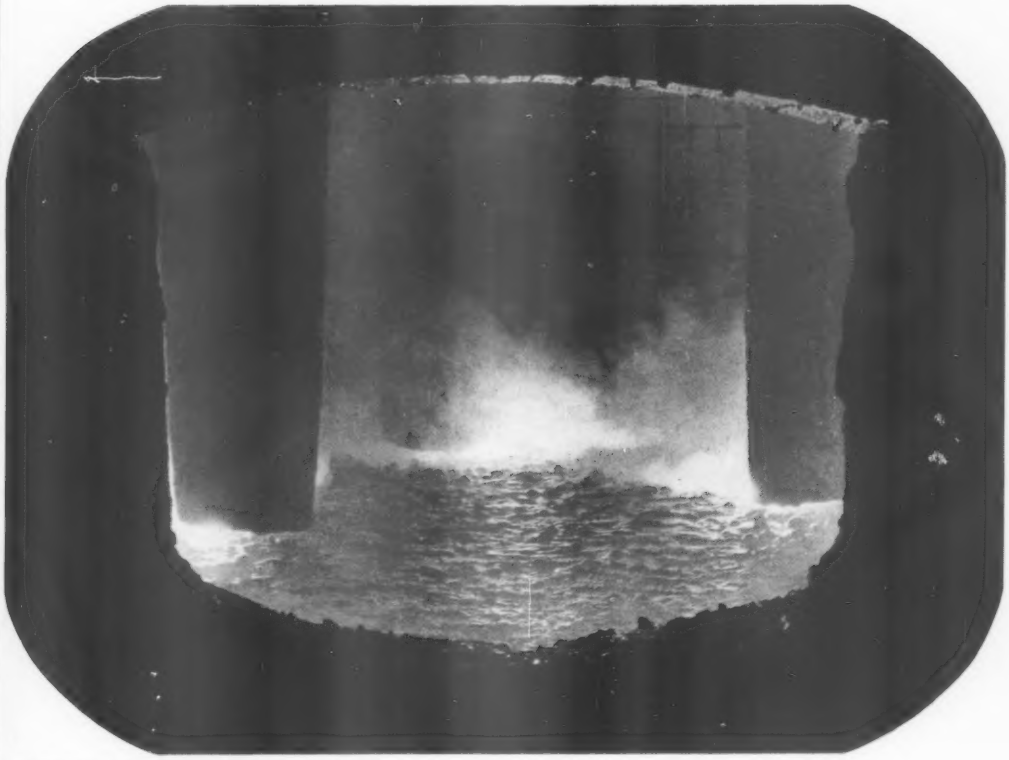

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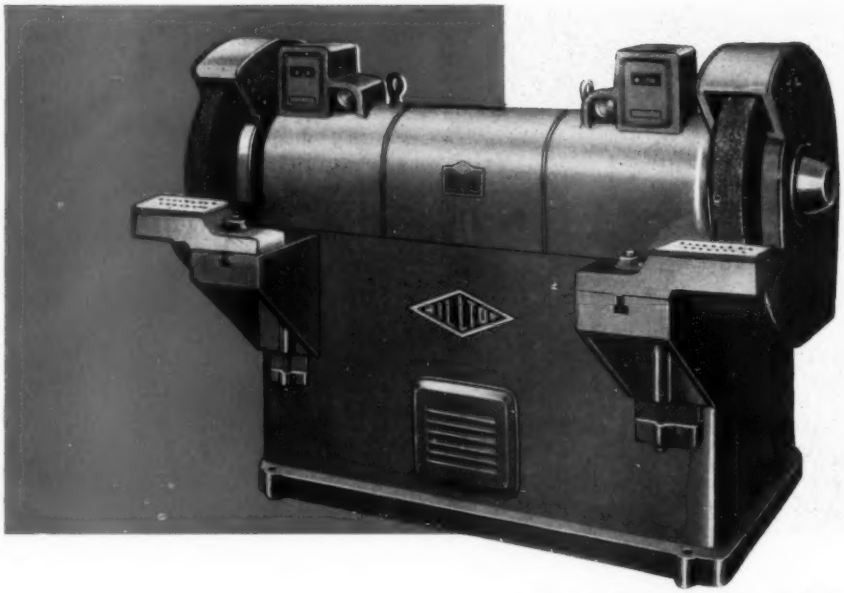

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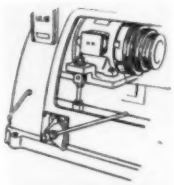

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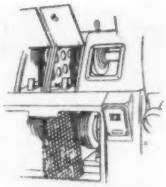

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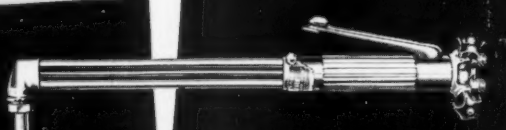

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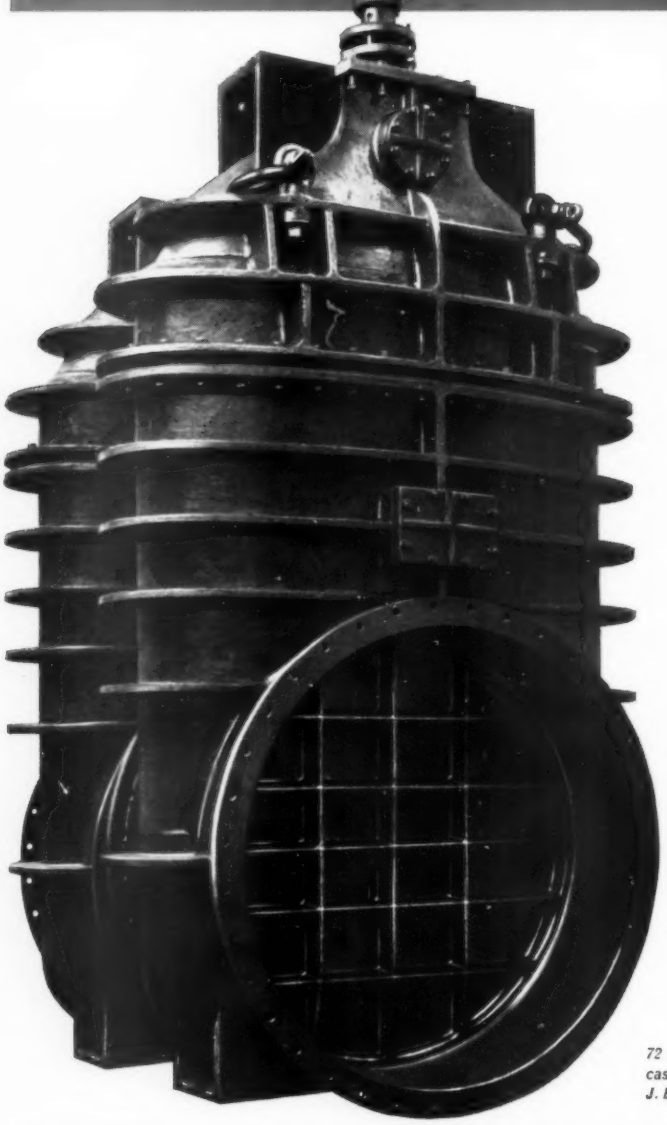

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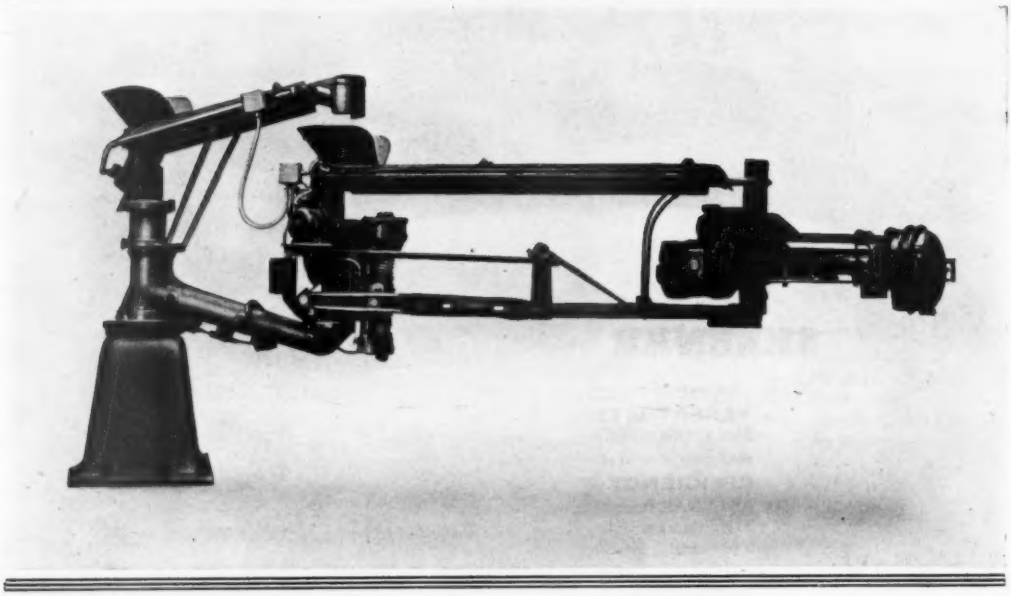

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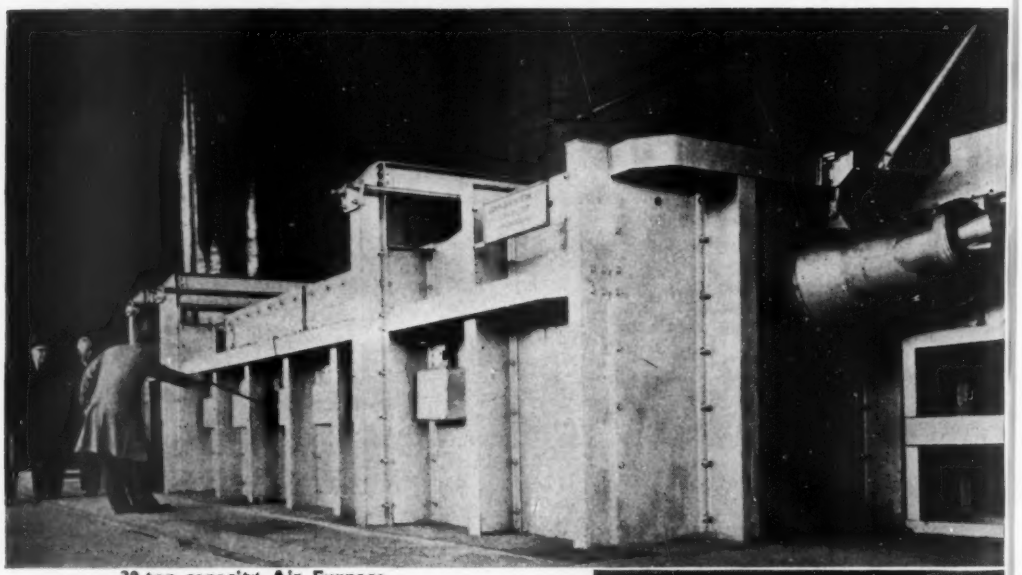

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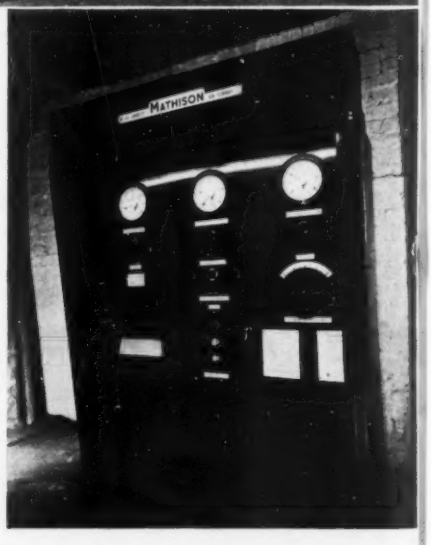

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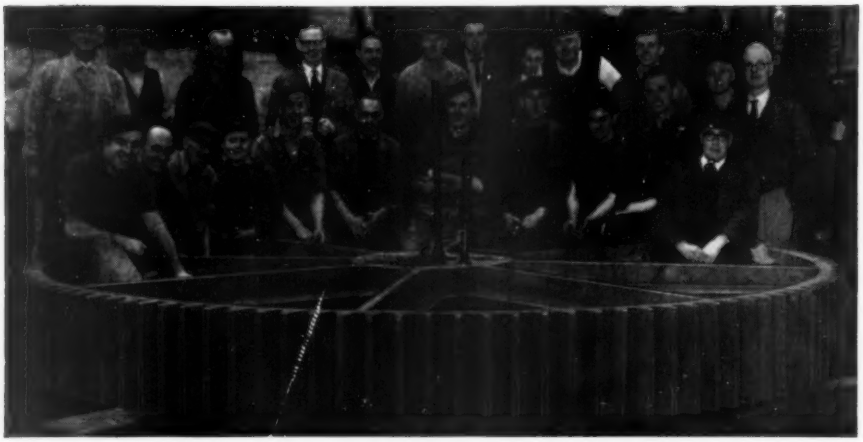

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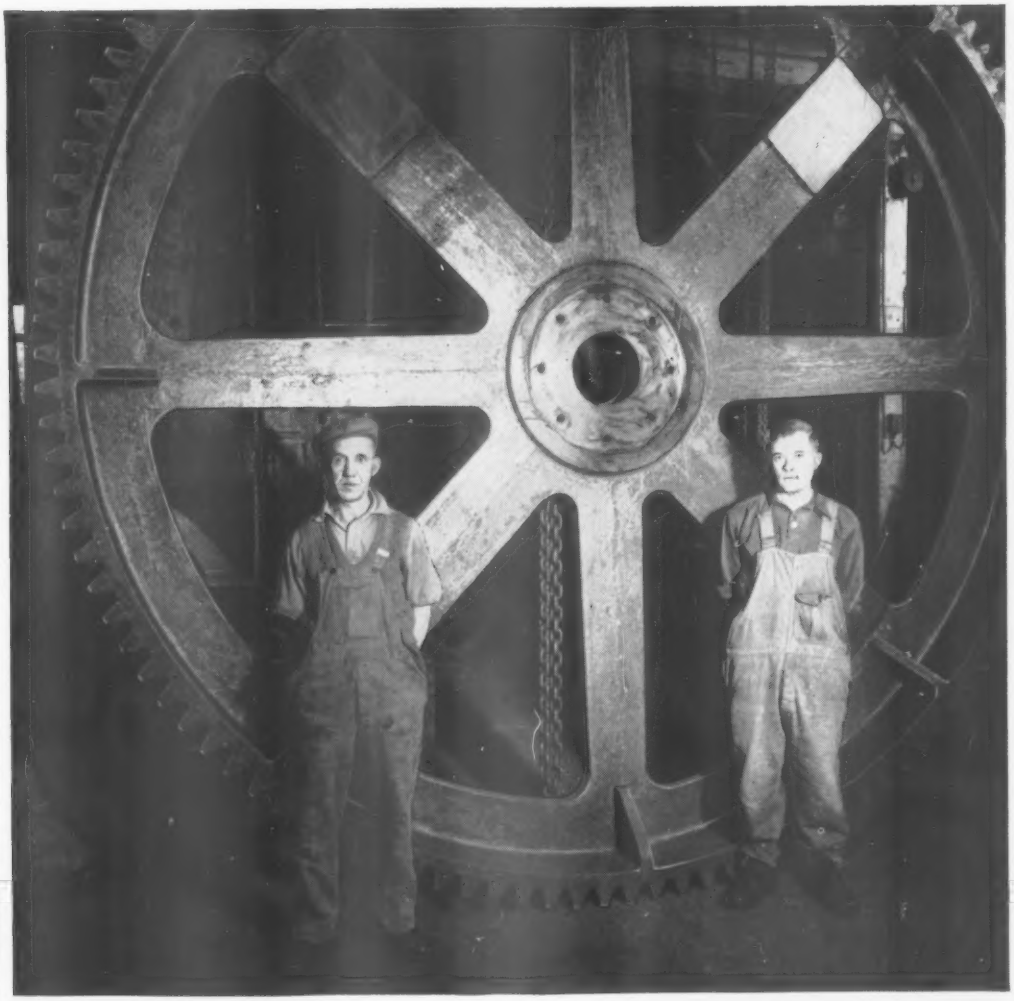

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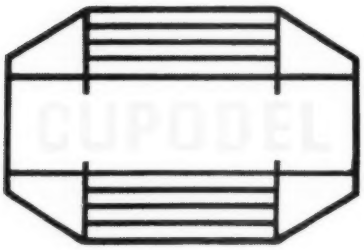

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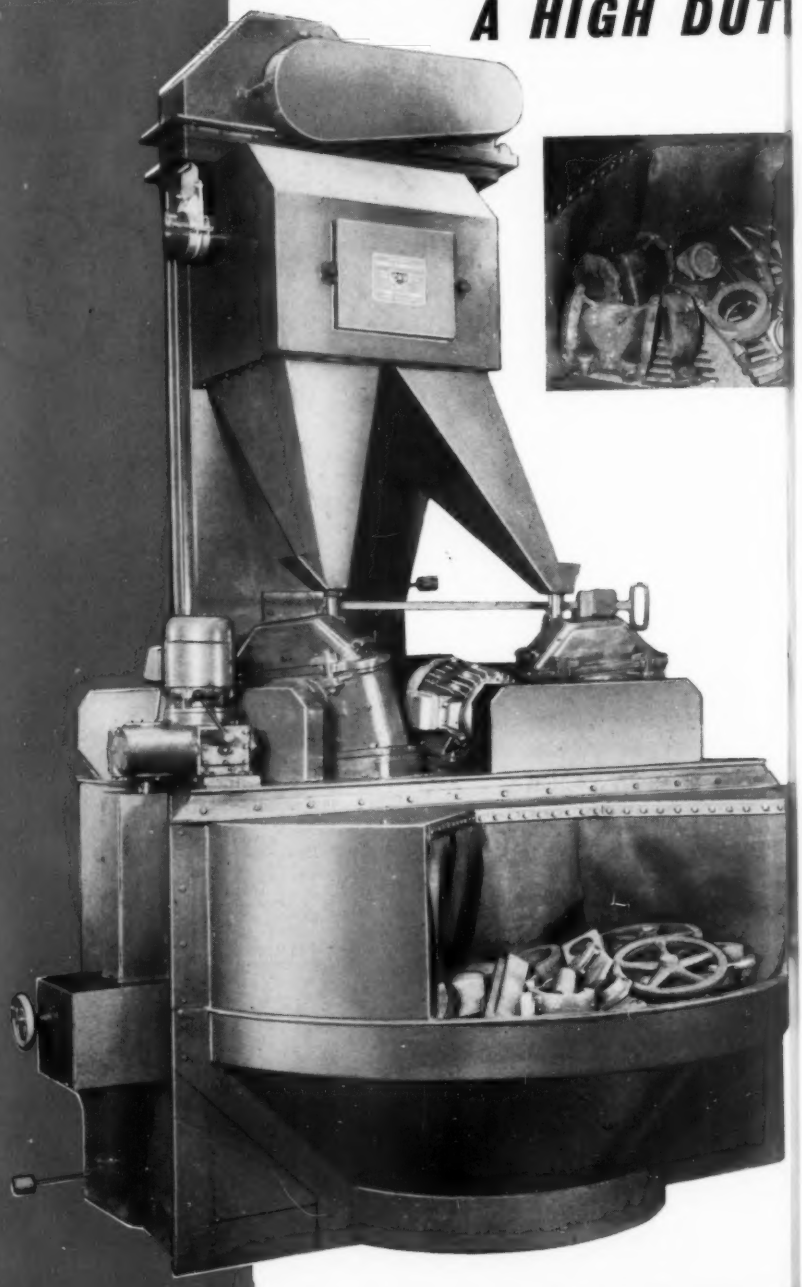

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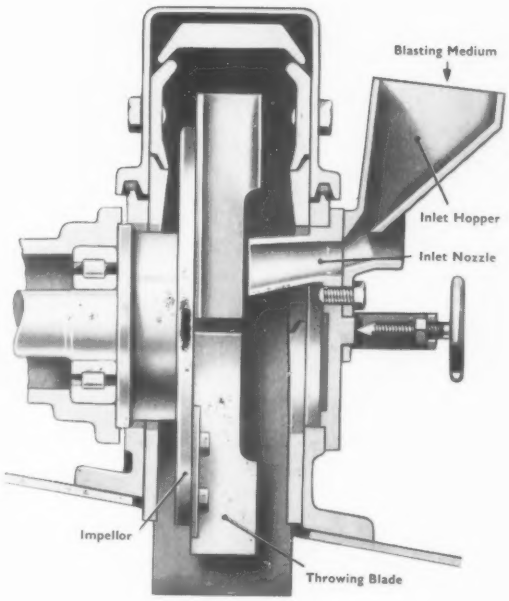

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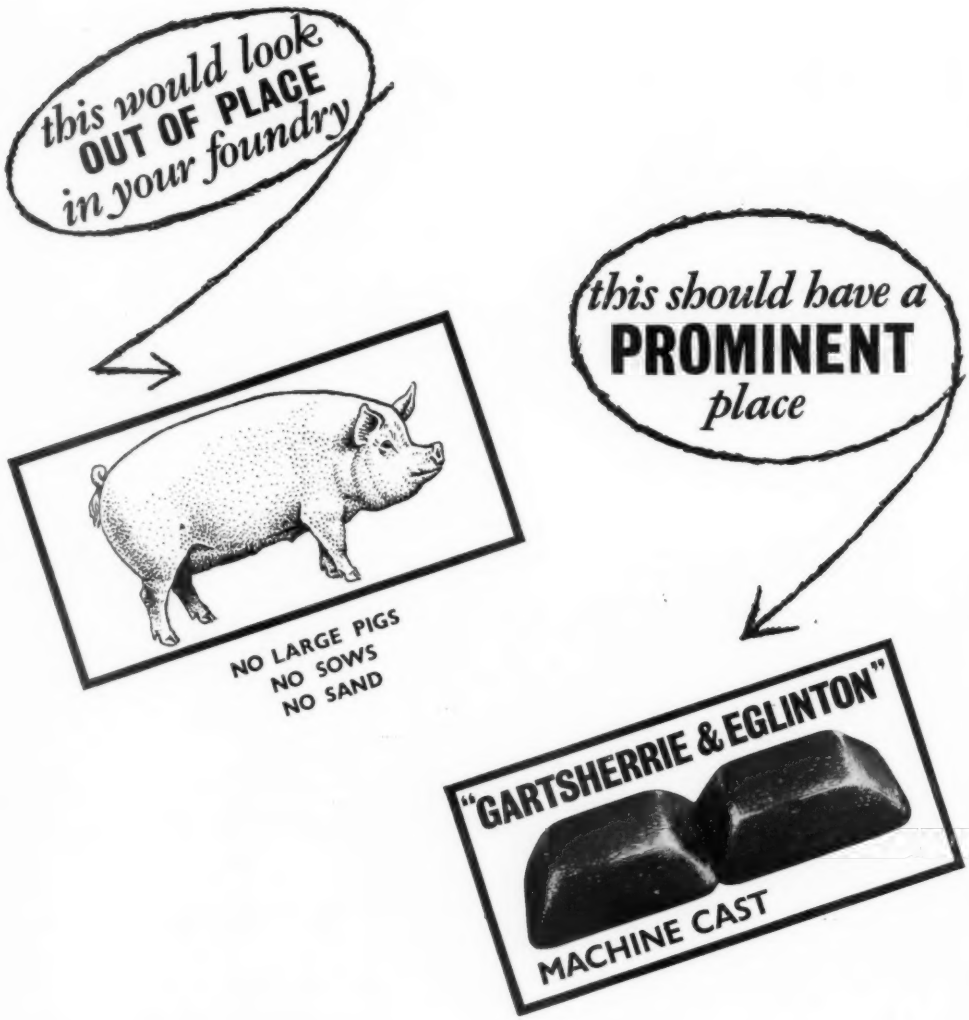

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Imports and Exports of Iron and Steel in September 752

Photograph by courtesy of
THE INTERNATIONAL HARVESTER CO. OF GREAT BRITAIN LTD., DONCASTER

CONVEYORS in a MODERN FOUNDRY PLANT by

Photograph shows:
The August's Mould Conveyor (closing to pouring, to cooling, to shakeout), which is a unit of the large August's Mechanised Sand Plant.

Sole Licensees and Manufacturers for the British Empire (excluding Canada, Australia and New Zealand) of the Simpson Sand Mixer.

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Buying and Selling

As every industrial firm both buys and sells, it is of interest to compare two sets of conditions, those of the purchasing officer and those used by the sales manager. At the moment there are before us two such documents, one is "Terms and Conditions of Contract"* and the other, "Standardization of General Conditions of Sales"—a report of committee No. 8 of the European Committee of Foundry Associations. The latter is an English translation, available for members of British foundry employers' associations, where its major use will be in connection with European exports, as standard conditions of sale have been adopted and are in use for several sections of the industry for domesic use in the various countries. The conditions included in the former, which is a second edition, are stated to be acceptable to the Contracts Panel of the Federation of British Industries.

A comparison of the two documents shows much agreement, but a few direct contradictions. Both agree that customers' patterns must be maintained in good order, but in one case it is at the cost of the foundry and the other at the cost of the buying firm. Another disparity is in the cost of packaging. Here in this country, boxes and the like are to be returned, but in Continental conditions they are to be invoiced to the buyer—this is only natural where frontiers have to be crossed to effect delivery. On the Continent, much use is made of bills of exchange, for the payment of goods supplied, even quite locally, and conditions are specified as to the procedure to be followed in cases of non-settlement. The Purchasing Officers' Report, on the other hand, covers the steps to be taken when a liquidator or receiver is appointed to take charge of the supplier's business. Another feature of the European Committee's Report is the insertion of clauses covering the supplier against consequential damages. In general, in this country, that is taken care of by the law of the land, but reference to the matter serves to remind UK founders doing export business that in Continental countries this may not be so.

It might seem likely, because of the disparities referred to, that in the future each order placed for castings will have to be scrutinized from the dual angle of the buyer's conditions of contract and the supplier's conditions of sale. Yet, there should be no insuperable difficulty in reconciling the two, and in cases of difficulty, it would seem advisable for the buyer to consult his sales manager, or the seller his purchasing officer, as to the justice of the claims put forward. Though selling is much more complicated to-day than a few decades ago, reliance on "Conditions" is so much better than trying—when trouble ensues—to establish at law just what are the customs of the trade.

* Published by the Purchasing Officers Association, Wardrobe Court, 146a, Queen Victoria Street, London, E.C.4 ; price 5s.

New Works for Lovell & Hanson, Limited

On Monday of last week, the Rt. Hon. Frederick Erroll, M.P., Minister of State, Board of Trade, performed the opening ceremony of a new works at Greets Green, West Bromwich, for Lovell & Hanson, Limited, manufacturers of "Hanlo" patented compression-joints and other non-ferrous plumbing and piping fittings. The celebration marked an expansion from the private house in which the business started 15 years ago to 60,000 sq. ft. of modern well-equipped workshops. A very large proportion of the output of the firm consists of machined brass and bronze castings, and a tour of the works by those present at the opening ceremony revealed the adoption of ultra-modern machinery, flow-production methods, spacious, neat and tidy workplaces, plus an excellent canteen and other amenities.

In declaring the premises open, the Rt. Hon. Frederick Erroll congratulated the firm on a wonderful achievement and amongst his remarks said that wherever he had gone, here and to the country's overseas markets—and potential markets—he had been struck by the drive and dynamism of expanding trade. The future, he added, belonged to the dynamic firm and, for this country, it meant that it belonged to the firm which looked for markets overseas as naturally as it looked for them at home. Speaking of the company's products, he said that experience suggested —and investigation had confirmed—that markets can be found for compression joints in many parts of the world. He expressed his interest in the proposed visit to the USA by Mr. Lovell to "prise open" that potentially vast market. A foundation of enterprise, research and knowledge therefore underlies the company's production plans and it was with assured confidence in themselves and their products that they had built up the firm to its present strength and planned for further expansion.

A brilliant facet of the function was the inclusion of a champagne and oyster bar among the buffet refreshments provided for the visitors after a tour of the works. To run this, "Fat Jack," direct from Wheeler's Restaurant in London's West End, and perhaps the world's leading expert in the preparation of fish food, was brought along and did a "roaring trade."

Tin Conference in Germany

The seventh annual German Tin Conference was held in Brunswick on November 24 in the Hall of the Chamber of Commerce, under the chairmanship of Dr. E. Nehring. An address was given by Dr. W. E. Hoare, assistant director of the Tin Research Institute, Greenford, on "Trends in the Manufacture of Tinplate," and Dr. B. Keysselitz, manager of the Institute's German office, spoke on the "Researches of the Tin Institute to Improve Tinplate Quality."

Other speakers at the conference included Mr. S. C. Britton, head of the corrosion section of the Institute, whose subject was "New Work on the Corrosion of Tinplate"; Dr. H. Flick, of Brunswick, who spoke about "Tinplate for the Canning Industry," and Dr. Wondriss who dealt with "Mechanical Testing of Tinplate." During the conference two films were shown on the use of tinplate in the canning industry.

Mr. A. A. TAYLOR has been appointed secretary of Sterling Metals, Limited, in succession to the late Mr. T. BARKER.

Forthcoming Events

DECEMBER 12

Institute of British Foundrymen

Lancashire branch: "Sketch of Progress in the Casting of Bronze," by J. R. Platt, 7 p.m., at the Midland Hotel, Manchester.

Institute of Metals

Scottish local section: Film evening, 6.30 p.m., at the Institution of Engineers and Shipbuilders, Elmbank Crescent, Glasgow, C.2.

DECEMBER 13

Association of Bronze & Brass Founders

Meeting of members in the London area at the Clarendon Restaurant, Hammersmith, W.6, commencing with luncheon at 12.30 for 1 p.m.

Institute of Chemical Engineers

"Analytical Instrumentation of Process-gas Streams," by J. C. Hawkes, 7.30 p.m., at the Blossoms Hotel, Chester.

Leeds Metallurgical Society

"Metals and Alloys used in the Jewellery and Silverware Industries," by Miss D. Pile, 6.30 p.m., at the University Staff House, University Road, Leeds.

Institute of British Foundrymen

Stoke-on-Trent section: "Shell Moulding," by L. H. Scott, 7.30 p.m., in the Stipendiary Court Room, Hanley Town Hall.

Slough section: "Centrifugal Casting of Non-ferrous Metals," by E. Ayres, 7.30 p.m., in the Lecture Theatre, High Duty Alloys, Limited.

Coventry & district section: "Casting Defects, Cause and Cure," by J. L. Francis, in Room A5, the Technical College, The Butts, Coventry.

DECEMBER 14

Institution of Plant Engineers

East Midlands branch: "Application of New Materials to Plant Engineering," by John Leyland, 7 p.m., in the Sherwood Room, County Hotel, Theatre Square, Nottingham.

DECEMBER 15

Institution of Production Engineers

Reading section: "Electronic Data Processing allied to Production Engineering," by F. W. Purchall, 7.30 p.m., at the George Hotel, King Street, Reading.

DECEMBER 16

Institute of British Foundrymen

Northampton section: Annual dinner, 7 p.m., at the Hind Hotel, Wellingborough.

Bristol and West of England branch: Discussion groups, 7.30 p.m., at the Royal Hotel, Bristol.

European Investment Casters' Congress

The next European Investment Casters' Congress is planned to take place in Italy, in either Florence or Milan, during the month of September 1961 (probably from the 11th to 13th). As at previous congresses, delegates are invited to participate in a castings competition, and offers of papers for presentation are welcomed. A new feature is that it is intended to ask each participant to give a short talk (lasting from five to ten minutes) on such subjects as the case-history of a casting, an example of the overcoming of difficulties in design or manufacture, or a successful improvement in the investment casting process. Those wishing to attend the congress are requested to make application immediately to Mr. H. J. Meerkamp van Embden, the president at Philips Research Laboratories, N.V. Philips Gloeilampenfabrieken, Eindhoven, Netherlands.

UNITED DOMINIONS TRUST announce the opening of new branch offices in Cheltenham, at 1, Imperial Square, and at Swindon at Woolwich House, 39, Commercial Road.

Technical Control of Steelfoundry Processes

Proceedings of the Sixth Annual Conference of the British Steel Castings Research Association

The general theme of the sixth annual conference of the British Steel Castings Research Association, held at the Hotel Majestic in Harrogate on October 20 and 21, was the technical control of steelfoundry processes. The special feature of the conference was the exchange paper by Mr. Clyde B. Jenni, research director and chief metallurgist of the General Steel Castings Corporation, Eddystone, Pennsylvania, under the Association's reciprocal scheme with the Steel Founders' Society of America. Other papers presented served well to elaborate particular features of technical control in British foundries.

The opening address by the chairman, was followed by the lecture on the "Annual Review of the Association's Activities," by Dr. A. H. Sully, M.SC. (director of research), with Dr. E. Gregory (Edgar Allen & Company, Limited) (chairman, research committee) in the chair. After lunch, the chair at the first session—the theme of which was "Technical Control in Steel Foundries"—was taken by Dr. C. J. Dadswell, B.SC. (English Steel Castings Corporation, Limited). Mr. Clyde B. Jenni then presented his paper, "Technical Control in Steel Foundries in North America," which was followed by a discussion. Afternoon tea was followed by session two, on the theme of "Technical Control of Steelmaking and Ladle Practice," the chair being taken by Mr. W. S. Scott (Darlington Forge, Limited—vice-chairman, BSCRA). The paper "Technical Control of Steelmaking" was then given by Mr. J. Blackburn (Bonnington Castings, Limited). Following the discussion on this, a further paper: "Technical Control of Ladle Practice and Pouring of Moulds" by Mr. F. Cousans (Hadfields, Limited) was presented.

Friday, October 21, commenced with session three, with Mr. J. S. Turnbull (Lake & Elliot, Limited), in the chair, the theme being "Technical Control of Sand Preparation and Mould Production." Mr. J. M. Middleton (BSCRA) presented the paper "Technical Control of Moulding Materials," and Mr. E. Arrowsmith (English Steel Castings Corporation, Limited) "Technical Control of Mould Production and Inspection of Moulds," both of which were discussed by the conference. Session four, on the theme "Technical Control of Heat-treatment and Welding," followed morning coffee, with Mr. G. L. Hancock (David Brown Industries, Limited—member of BSCRA Council) in the chair. The paper "Some Factors Affecting the Control of the Heat-treatment of Steel Castings" by Mr. W. J. Jackson and Mr. D. B. James (BSCRA) was then given, followed by "Technical Control of Welding in the Foundry" by Mr. M. G. Hipkins (Head Wrightson & Company, Limited), both papers being discussed.

The final session, following lunch, had the theme "Ultrasonic Detection of Defects in Cast Steel" with Mr. J. Currie (Blackett, Hutton & Company, Limited), in the chair. Dr. A. H. Sully and Mr. J. D. Lavender (BSCRA) then presented "Ultrasonic Detection of Defects in Cast Steel." Following the discussion on this paper, the conference chairman wound up the proceedings.

Chairman's Address

In the course of his opening remarks at the Conference on Thursday morning, Dr. R. Hunter, the chairman, said that if the numbers attending the Conference were a valid guide, this one promised to be the most successful Conference organized by the Association. The numbers attending had grown from about 130 in 1955 to over 200 this year. After welcoming all present at the meeting, Dr. Hunter made special reference to Mr. Clyde B. Jenni and added that those attending were looking forward to hearing Mr. Jenni's presentation and discussion of his paper, as well as meeting him more informally during the period of the Conference. Dr. Hunter indicated that the papers presented provided a balance between the experience of members operating steel foundries, and the staff of the British Steel Castings Research Association, and they covered the principal aspects of control in the steel foundry. In reviewing briefly the programme of the Conference, Dr. Hunter said that all the authors were recognized as being amongst the foremost experts in Britain on their particular subject. When referring to the paper by Dr. Sully and Mr. Lavender on the ultrasonic examination of cast steel, Dr. Hunter said that while this subject was only marginal to the main theme of the Conference, it was, nevertheless, included because it was a new development which the Association believed could be eventually an important "tool" in the control of the quality of steel castings. This research had been sponsored by the War Office and Dr. Hunter welcomed the representative of the sponsors, Mr. Halmshaw of the Armament Research and Development Establishment, who had been in close liaison with the

At the Annual Conference of the British Steel Castings Research Association, recently held in Harrogate are (from left to right): Mr. W. S. Scott (Darlington Forge, Limited), vice-chairman of Council, BSCRA; Mr. Clyde B. Jenni (General Steel Castings Corporation, Eddystone, Pa.), who presented the exchange lecture under the Association's reciprocal scheme with the Steel Founders' Society of America, and Dr. R. Hunter (Clyde Alloy Steel Company, Limited), chairman of Council, BSCRA.

Association throughout the work. The Association had arranged with the manufacturers of ultrasonic testing-equipment for their latest equipment to be demonstrated at the Conference, and Dr. Hunter expressed his appreciation to these firms for their ready co-operation.

Dr. Hunter went on to welcome Mr. A. R. Parkes (Editor, FOUNDRY TRADE JOURNAL) who was attending the Association's Conference for the first time, and two members of the Association's research committee, Mr. E. J. Vaughan of the Admiralty and Dr. V. Kondic of the Department of Industrial Metallurgy of Birmingham University. In welcoming Mr. John Bolton, director and secretary of the British Steel Founders' Association, Dr. Hunter recalled that Mr. Bolton, who until recently was the secretary of the BSCRA, had done much to ensure the success of these Conferences in the past.

Dr. Hunter spoke of a new joint enterprise between the BSFA and BSCRA, in the form of a Steel Casting Development Committee, charged with the task of disseminating data designed to lead to the greater use of steel castings and convincing engineers that steel castings are reliable engineering components. Technical control of all stages of production is a necessary pre-requisite in producing sound steel castings. It was, therefore, appropriate that this year, which had marked an acceleration of the product development activity, consideration and discussion should be devoted to this important subject, which if properly applied in foundries would contribute to improving the reputation of steel castings in the eyes of engineering designers.

In closing his address, Dr. Hunter conveyed good wishes for the success of the Conference from Mr. C. H. Kain, chairman of the BSFA, who for the first time was unable to attend the Conference. With these remarks, Dr. Hunter said he had much pleasure in opening the Conference and then called upon Dr. Gregory to take the chair at the first session of the Conference. During these technical sessions, the following papers were presented:—

Technical Control in Steel Foundries in North America

*By Clyde B. Jenni**

In the United States and Canada, there are nearly 200 steel foundries making castings ranging in size from fractions of an ounce to upwards of 300 tons in weight, and castings nearly 100 ft. in length have been produced. The Author discussed very thoroughly every aspect associated with production of steel castings, under the following headings:—Steelmaking, foundry practice, cleaning-room practice, heat-treatment, welding, inspection, quality control, foundry planning, safety, and dust control.

When dealing with moulding materials, the Author said that with few exceptions, all steel foundries used silica sand for moulding and core-making, one foundry used only zircon sand, and others used zircon sand, olivine, or chamotte in parts of their operations. The Steel Founders' Society of America had issued Tentative Specifications for raw materials, which were used by many as purchase specifications. These included Tentative Specifications for (i) washed and dried sand, (ii) zircon sand and flour, (iii) western bentonite, (iv) gelatinized cereal binder. SFSA Research Report No. 7, "Comparison of Core Oils and Binders, and Development of Acceptance Tests," was used for conducting either an evaluation or for acceptance testing of a core oil or binder. The reclamation of used foundry sands had attained widespread acceptance in US steel foundries and, according to a recent survey, about two-thirds were using true reclamation-methods. Dry scrubbing and wet scrubbing were used and in some instances, a combination of wet scrubbing, classification, de-watering, drying, and dry scrubbing was used.

In cleaning-rooms, pneumatic chisels and hand grinding were being replaced rapidly by the Arcair torch. Amperages of from 900 to 1,200 amp. were frequently used, with some machines up to 2,000 amp. The types of shot or abrasive used varied with equipment and individual cleaning problems. SFSA Tentative Specifications for cast-steel abrasives, and for malleable-iron abrasives, which included sample preparation and acceptance-test methods were used. The best method of quality control of welding, the Author said, was through supervision by the welding foreman and by the use of welding-process procedures which

* Director of research and chief metallurgist, General Steel Castings Corporation, Eddystone, Pennsylvania.

were specified by the metallurgical control group. SFSA Recommended Practice for Repair Welding and Fabrication Welding of Steel Castings, published in 1957, was frequently used as a control of welding practices in foundries. Commercially-available welding electrodes were classified by the American Welding Society and the American Society for Testing Materials.

Methods and Control

Non-destructive test methods in common use in the USA were:—visual examination, radiography, magnetic particle examination, liquid penetrant methods, and ultrasonic inspection. The use of non-destructive testing was often part of the specifications governing the purchase of castings. Recommended practices and procedures for testing, issued by ASTM were being used by steel foundries. Amongst these were:—"Industrial Radiographic Standards for Steel Castings," and Tentative Methods for (i) dry-powder magnetic particle inspection, (ii) wet magnetic particle inspection, (iii) reference photographs for magnetic particle indications on ferrous castings, (iv) liquid penetrant inspection, and (v) ultrasonic testing by the reflection method. The Author continued by saying that the basic objective of quality control was the prevention of defects, maintenance of high quality, and cost control. These methods varied from control procedures and the recording of data to statistical quality-control. A simple graphical representation of data was often used and the charts produced were very helpful in showing the operators their results. Statistical quality-control methods were used in a number of American foundries. Pay-roll departments now operated electronic computers or tabulating equipment and these could be utilized for data analysis of various kinds.

Adequate records and data sheets covering the complete history of the castings were useful in many respects, and these included types, location and sizes of feeder heads and gates, changes in feeder heads or gates and the reasons for the changes, chilling practice, padding practice, information on the sand mixes used for moulds and cores, recommended pouring temperature and pouring rate, a record of dimensional discrepancies, of defects by types and location and, in some instances, of the amount of repair welding necessary. In order that the requisite quality be built into the casting, the Author stressed that the foundryman must have a knowledge of its proposed use, the magnitude and location of the stresses involved, important surfaces and vital dimensions and this information could only be developed by close co-operation with the casting designers and the customer's engineers.

Mr. Jenni concluded by saying that rapid strides were being made by metallurgists in the development of high-strength steels. This was of particular interest to aircraft designers who wanted light weight, close dimensional-control and extremely high-quality castings. Much work was being done in this field and many foundry planning groups were experimenting with closer controls and investigating new methods and materials to achieve these results.

Technical Control of Steelmaking

*By J. Blackburn, F.I.M.**

The Author commenced his contribution by stating that the foundry expected to receive liquid steel (*a*) at the right time, (*b*) in the correct quantity, (*c*) of the correct composition, (*d*) at the right temperature, and (*e*) at the lowest cost. The machinery by which this was achieved was, first, by control of raw materials and, secondly, by control of the process.

Steel scrap was by far the most important raw material used in steelmaking and the chief items for control of scrap the Author listed as:—quantity, composition, physical condition and segregation. Foundry returns would generally have been shotblasted for ease of flame-cutting and would thus be free of sand. This was important for in a basic furnace, sand attacked bottom and banks and required much lime, and possibly an extra slag-off before a useful basic slag could be made. In an acid-lined furnace, it could produce a large and unworkable slag-volume. Segregation of foundry return-scrap began at the cutting stage, and the only workable solution appeared to be to paint all runners and feeder heads before cutting, using a code of paint colours to differentiate between different steel-compositions. Compositions of ferro-alloys as declared by suppliers were usually reliable, but an analysis check was a sensible precaution, the Author added. Good scales were essential, and operators should be trained to weigh the exact quantity called for. The cost of electrodes represented 15s. 0d. to 25s. 0d. per ton of liquid steel, so they were worthy of care and attention from the time of receipt. Their electrical conductivity, diameters and screw threads and ends should be examined and after inspection, electrodes should be stored in a dry, warm place.

Working the Melt

Control during the melt-down period depended upon the furnaceman; voltage tappings of a furnace were fixed and the best he could do was to carry the highest voltage as long as was safely possible. Recently, the British Iron and Steel Research Association had developed an automatic power-input control (APIC) unit for arc furnaces which should, in future, provide a valuable additional "tool" for technical control of arc-furnace steelmaking.

If ore was used for carbon oxidation, the report continued, the weight to be added could be calculated when the carbon to be removed was known. In the case of oxygen injection, the work of the BSCRA on the "Control of Oxygen Injection in Foundry Steelmaking," and particularly in promoting the use of reliable oxygen-metering equip-

* Bonnington Castings, Limited.

ment, was very valuable and eliminated the guesswork out of this phase of steelmaking. It was known that hydrogen concentration was reduced during the "boil" and then increased progressively from slag-off to tapping. Excessive hydrogen and oxygen in the finished steel caused gas holes in castings or impaired physical properties.

To check that deoxidation has been satisfactory and the steel would make good castings, a sample was drawn from the furnace and poured (without aluminium addition) into a freshly-made greensand mould. This, the Author said, should show no signs of pinholes on the outside surfaces and, if sawn through vertically, should reveal a single shrinkage-cavity near its centre. Finally, Mr. Blackburn said that aluminium was the commonest and most-powerful final deoxidant, but no deoxidant or combination of deoxidants, could be a substitute for good steelmaking practice.

Technical Control of Ladle Practice and Pouring of Moulds

*By F. Cousans, F.I.M.**

Dealing first with ladles, the Author said that in steel foundries, three main methods were used for transferring the liquid steel from the melting furnace to the mould; by bottom-poured ladles, lip-poured ladles and teapot-spout ladles. Some steel foundrymen preferred to use a rammed ladle-lining, but whatever lining materials were used, the lining must be efficiently dried and preheated. From a good-quality high-alumina firebrick for lining ladles used for carbon and low-alloy steels, throughputs of 250 to 300 tons of liquid steel (2½-ton charges) per lining had been obtained, and in the case of manganese steel, throughputs of 160 to 180 tons had been obtained from firebrick linings.

The advantage of lip-poured ladles was that it was easy to see the amount of steel in the ladle. The disadvantages were the high loss in temperature per unit time and the danger of slag passing over the lip with the steel. In the case of the teapot-spout ladle, the temperature loss per unit time was lower, but there was a tendency for the metal in the spout to get cold and freeze up. The Author next dealt with the advantages of bottom-stoppered ladles, saying that the heat losses were low and the steel being taken from the bottom of the ladle was relatively clean. Disadvantages were the danger of a defective stopper causing metal losses, the added cost of the stoppers and nozzles, and the difficulty of determining the exact amount of steel in the ladle. If the steel was too hot, foundrymen were likely to experience bad "strips," and if the superheat was inadequate, they might get "cold laps," short runs or lack of sharpness on the edges of the castings. The Author next gave the following figures which showed the superheat which had been found successful for the casting of different sections of medium-carbon steels. Section less than ⅛ in., superheat 135 deg. C.; section ¼ to 2 in., superheat 80 deg. C., and section over 2 in., superheat 50 deg. C.

Pouring of Moulds

With top-pouring, suitable temperature-gradients were obtained, resulting in more efficient feeding, but there was the likelihood of more mould/core erosion and the possibility of splashing. In the case of joint running, unless very special precautions were taken, the final hot metal at the joint would result in hot-tears. Bottom gating should produce cleaner castings, but secondary shrinkage effects and hot-tears or shrinks close to the ingates might occur, the Author added. Intermediate pouring-cups or dishes were a valuable aid, with both lip or bottom-poured ladles, in maintaining a standard ferrostatic head of liquid steel, thus obtaining a constant flow of steel. When attempting to cope with these problems of control of temperature and pouring speeds, it was necessary to instruct all persons connected with such work and the results, the Author said, would be surprisingly successful.

* Hadfields, Limited.

Technical Control of Moulding Materials

*By J. M. Middleton, A.Met., A.I.M.**

This paper discussed the type of control that was needed at each stage during the production of foundry moulding-materials, in the light of new developments in this field. Silica sands, when obtained from reputable suppliers, were generally reasonably consistent in their chemical composition, but sand could vary in grading, and mechanical analyses should be carried out on all supplies of sands, preferably before they entered the foundry. Dry silica-sand segregated every time it was moved and segregation could affect sand grading to a greater extent than the variations that might occur with a given sand with supply. The Author continued by saying that naturally-bonded sands were less consistent in composition and in properties than silica sands and frequent checks on the total clay-content of the sand were desirable. "Compo" could be a difficult material to control and best results were obtained by those foundries who prepare their own mixtures. Cereal binders and core-oil binders were rather difficult to test and it was one of the functions of the Association to evaluate any new bonding-materials that came on to the market.

Mixing and Milling

The mixing and milling of moulding sand mixes was a most important process in the foundry. If milling was inadequate, the sand was weak and it might be necessary to add more bond to get the required physical properties. Optimum milling-

* The Author is on the staff of BSCRA

times should be determined for each mix and each mill, and should be adhered to at all times. Water was probably the most abused foundry material, and the moisture content was the most important variable in moulding sand. During recent years, equipment had been developed which, it was claimed, would automatically control moisture in a foundry sand but these methods were, in the Author's opinion, most suited for a unit-sand system.

Modified binders with air-setting properties were becoming very popular in steel foundries. The milling times, air temperature and humidity affected the setting time and rate of hardening of such sands, and certain foundries had determined these effects and adjusted their mix accordingly.

The sand for the CO_2 Process should be low in clay and fines and should be dry. However, silicates had been recently introduced, having low SiO_2: Na_2O ratio of 1.6:1, which were said to work satisfactorily with wet sand. One of the main problems with the CO_2 Process in steel foundries was the lack of breakdown of the sand after casting and work to date by the Association suggested that refractory inorganic additions were more helpful than organic additions.

Finally, the Author dealt with mould paints and washes for steelfoundry use. These, he said, had been investigated by the Association and the main conclusions from this work were that (*i*) the substitution of a swelling bentonite by sodium alginate as the suspending agent reduced susceptibility of the paint to cracking on drying and shock heating, and (*ii*) only thick films (above 0.02 in.) of refractory paints that were free from cracks would prevent penetration under high ferrostatic-pressures. Paints based on zircon, alumina and silica flours gave equally good results.

Technical Control of Mould Production and Inspection of Moulds

*By E. Arrowsmith, B.Sc.(Tech.), A.R.I.C.**

This paper covered some of the methods of obtaining good results in greensand, skin-dried and drysand moulding work over a range from fairly small to very large castings. To achieve this, a production team of a dual nature was required, he said.

On the one side were the technical sections, and on the other those dealing with production. They must be well integrated and must work together amicably under the overall guidance of the foundry director. Dealing first with (*a*) technical sections, the Author said these were responsible for formulating the best methods of manufacture of castings and included methods section, quality-control section, sand laboratory, metallurgical section and development section. On the other hand, (*b*) production sections, were responsible for the planning and achieving of the production necessary to meet delivery schedules by pattern-shops, moulding and coreshops.

* English Steel Castings Corporation, Limited.

The general principles of technical control were the same for all types of moulding methods and included good design of the casting, dimensional accuracy of "tackle," the correct materials, the right type of supervision, tight inspection-control, and good casting-techniques. Next, practical points covering methods, preparation of tackle and materials for greensand, skin-dried sand and drysand mould and core production, were described in detail and examples were given of the inspection checks carried out at the various stages of preparation and production of each type of casting.

The technical and production teams responsible for the quality of the product must be conscientious and critical at all times, the Author stated, as castings could so easily be spoiled by a relaxation of control at any stage of manufacture. A continuous daily effort was required by all concerned to ensure that the best methods were used and that dangerous short cuts and backsliding were eliminated. There was no doubt, he concluded, that the extra care taken and the money spent on control at the mould and coremaking stage paid off handsomely when the castings reached the fettling shops.

Factors Affecting Control of Heat-treatment of Steel Castings

*By W. J. Jackson, M.Sc.(Eng.), A.R.I.C., A.I.M., and D. B. James, B.Sc.**

In the first part of the paper, the definition, purpose of heat-treatment and metallurgical aspects of heat-treatment of steel castings were considered. The second part dealt with furnace operation, its control, and the investigations into short-time heat-treatment were described. Work by the Steel Founders' Society of America and by the British Steel Castings Research Association had shown that for carbon and certain low-alloy steel castings, the mechanical-property requirements of standard specifications could be met with much shorter heat-treatment times than were generally employed. The results showed that for sections up to 5 in.:—(*a*) homogenization treatments were not necessary to meet specification properties, and (*b*) soaking for 15 to 30 min. (regardless of section size) at the austenitizing temperature was satisfactory.

The short soaking-times referred to in both researches commenced from when the centre of the casting was up to temperature. This was determined by means of thermocouples embedded in castings of the required thickness. Thus, it followed that before short times could be adopted in practice, it was necessary to check that the furnace was uniformly heated and to know the time it took the centre of castings of various thickness to reach the furnace temperature.

Next, the Authors listed the economic advantages of short heat-treatment cycles. The metallurgical advantages were:—(*a*) less time available for surface decarburization during austenitizing, and (*b*)

* The Authors are members of the staff of the British Steel Castings Research Association.

less time available for the development of temper brittleness during tempering. In theory, there were certain metallurgical disadvantages, which the Authors enumerated. However, from a practical viewpoint, they need not be classed as disadvantages, unless they were proved to be responsible for some defect or deficiency. (1) The omission of a prior anneal or normalize to castings that were to be hardened could make the removal of heads, fettling, rough machining or repair welding more difficult; (2) high-tensile steel castings required a high-temperature anneal, followed by annealing or normalizing at lower temperatures prior to hardening, to develop satisfactory ductility; (3) optimum low-temperature properties were obtained in plain carbon steel castings by multiple treatments to refine the grain, and (4) stress-relief annealing could be carried out satisfactorily at ultra-short times. Shorter heat-treatment times and cycles could be used, but a high degree of control of furnace temperature and operating conditions was required, and a knowledge of furnace temperature-gradients and time for various sections to reach temperature was essential, the Authors concluded.

Technical Control of Welding in the Foundry

*By M. G. Hipkins, B.Sc., A.I.M.**

At the commencement of his paper, the Author said that the rôle of welding was two-fold; first, for the repair of defects occurring during the manufacture of the castings, and, second, in the fabrication of composite structures. The principal effects of the welding thermal-cycle were (*a*) the production of weld-hardened zones in the parent material immediately adjacent to the fusion zone, (*b*) formation of thermal stresses, and (*c*) distortion. By preheating it was possible to minimize these effects, but if the carbon content was below 0.30 per cent. in plain carbon steels, preheating was usually necessary. Preheating temperatures between 100 and 200 deg. C. were required for castings having a carbon content of up to 0.50 per cent. and where the alloy content was also high, temperatures of up to 350 deg. C. might be required.

Choice of Method

Three factors must control the selection of the welding method used, and these the Author said were (*a*) cost, (*b*) rate of deposition and (*c*) metallurgical quality of the deposit, the most important of these being metallurgical quality.

More than 90 per cent. of welding carried out in steel foundries to-day was by metallic arc using covered electrodes. The quality of welds on alloy steels had been greatly improved over recent years by the judicious use of low-hydrogen electrodes. Considerable savings were possible by the use of iron-powder electrodes, *i.e.*, electrodes which had coatings loaded with considerable amounts of iron powder. The cost of tungsten inert-gas arc welding (TIG) welding was relatively high and its use normally confined to special applications where it was essential to have a weld metal of matching composition and no coated electrode was available.

Metal inert-gas arc welding (MIG) process was particularly suitable for the repair of large castings when appreciable quantities of deposited weld-metal were required. The shielding gas was usually argon with small amounts (1 to 5 per cent.) of oxygen ("Argonox"). Carbon-dioxide, which was much cheaper than "Argonox," was now being used successfully as a shielding gas and this process was just breaking into the field of steel casting repair and fabrication. Fully-automatic and semi-automatic equipment for submerged arc-welding was available, the Author continued, and it was possible to deposit up to 20 lb. of metal per hour using currents of 700 amp, and this process was probably the most economical means of making extensive repairs on carbon or low-alloy steel castings.

Electroslag welding equipment was available which would weld material up to 20-in. thick in one pass and, in the USSR, it was widely used in the field of casting fabrication. The process was clearly unsuitable for the repair of normal casting-defects.

Finally, the Author said that with the possible exception of some low-carbon unalloyed steels, all castings should be given some form of post-weld heat-treatment. This might range from stress-relieving in the temperature range 600 to 650 deg. C. to a full normalizing-treatment at 830 to 880 deg. C., or even the specified quench and temper.

* Head Wrightson & Company, Limited.

Ultrasonic Detection of Defects in Cast Steel

*By A. H. Sully, M.Sc., Ph.D., F.I.M., F.Inst.P., and J. D. Lavender, A.I.M.**

The paper described the investigation of the factors affecting the sensitivity of ultrasonic inspection of cast steels. Among the factors that had been studied were (*a*) the roughness of front and back surfaces, (*b*) the macrostructure of the steel, and (*c*) the microstructure of the steel, as affected by heat-treatment. It had been demonstrated that the transmission of ultrasonic energy through sound cast-steel occurred with no more attenuation than its transmission through wrought steel, provided that the castings were heat-treated before testing. The presence of a columnar zone at or below the surface of the castings was no barrier to the transmission of ultrasonic energy. Although a rough surface to the casting caused a considerable attenuation of the input signal, quite small defects could still be detected beneath as-cast and heat-treated surfaces. Relatively rough hand grinding appreciably reduced the surface attenuation and the sensitivity was further improved by

* The Authors are attached to the British Steel Castings Research Association, Dr. Sully holding the position of director.

rough machining. The roughness of the back surface was without significant effect on the attenuation of the ultrasonic beam. For very rough input-surfaces, water immersion and the use of a 2½ mc per sec. probe appreciably reduced the surface attenuation and improved the sensitivity of the method. It was not always convenient to immerse castings in water, and the BSCRA was working on a special design of probe by means of which the ultrasonic beam might be directed into the casting through a coupling jet of water.

Dealing with ultrasonic examination, the Authors said that like other methods, it had its own specific advantages and disadvantages. Among its advantages were:—(1) the equipment involved was relatively inexpensive; (2) it could be used on the foundry floor; (3) it was rapid, and (4) it gave a precise definition of the depth below the surface of defects when these were detected. Its disadvantages were given as (1) it required a skilled, intelligent and conscientious operator if the best results were to be obtained from it, and (2) although photographs could readily be taken of defect echoes, these did not provide an unequivocal indication of the nature of the defect, as did a radiograph. The ultrasonic technique could be recommended as a method that many steel foundries could use with advantage to supplement other methods of examination for the examination of section thicknesses of 1-in. or more. Probably its most useful function would be in assisting the development of satisfactory foundry methods and in routine checking in production where X-ray examination was not mandatory. By the intelligent use of ultrasonics, an appreciable economy could probably be effected in the expenditure on X-ray film.

* * *

(*Editor's Note.*—It is intended to publish some of the Conference contributions in full in future issues of the JOURNAL.)

Census of Production 1960

The Census of Production to be taken in 1961 for the year 1960 will be a sample inquiry and the questions asked will relate only to the total value of goods sold and work done, stocks and capital expenditure. An order prescribing the matters about which returns may be required has now been made by the Board of Trade. Undertakings producing coal, gas, electricity, oil-shale, crude or refined petroleum or shale oil products are exempted from making Census of Production returns. (Information corresponding to that collected in the Census will be obtained from these undertakings by the Ministry of Power). The Order, which operates from December 31, 1960, is the Census of Production (1961) (Returns and Exempted Persons) Order, 1960 (S.I.1960 No. 1978). Copies may be obtained from Her Majesty's Stationery Office, Kingsway, London, W.C.2, and branches, or through any bookseller (price 2d., by post 4d.).

IN THE FACE of world-wide competition, Steel, Peech & Tozer, of Rotherham, a branch of the United Steel Company, Limited, have secured contracts to the value of £750,000 for the supply of railway axles and wheels to Mexico.

Industry and Rating Valuation

One of the main purposes of the Rating and Valuation Bill, published recently, is to end the 50 per cent. de-rating of industrial and freight-transport (with the exception of BTC freight-transport for which the commission makes a payment of about £2,750,000 in lieu of rates). Another Bill is to be introduced to impose full rating on industry and freight-transport in Scotland in 1963, "or if that proves impracticable as soon thereafter as possible."

The general purpose of the legislation is to prepare the way for new valuation lists for rating due to come into force on April 1, 1963. Industry and freight-transport are now rated at 50 per cent. of their 1956 rental values, the proportion having been increased from 25 per cent. in 1959.

The Ministry of Housing and Local Government points out that the withdrawal of the 50 per cent. relief does not mean that the share of the rates borne by industry will be doubled—because the simultaneous rating at full value of shops, offices, etc., and the rating of houses at current instead of 1939 values will substantially offset any increase in industry's share of the total rate burden.

After re-rating in 1959 industry and freight-transport had a rateable value of about £80,000,000, of which over £77,000,000 is industry. This represents some 11¼ per cent. of the total rateable value for England and Wales.

When Part II of the Bill comes into force, Clause 3 would enable the Minister at some future date, after appropriate consultations, to prescribe formula methods for valuing the property of the National Coal Board and other properties at present assessed by reference to the accounts, receipts, or profits of the undertakings occupying them (*e.g.*, the docks), or by reference to royalties (*e.g.*, quarries and other extractive industries).

The Minister's crumbs of comfort for industry are, in some instances, swept away where industrial premises can be assessed higher if their equipment comes under the Plant and Machinery Order, 1960. This refers particularly to large structural plant, such as that used in the steel and shipbuilding industries, and in cement and chemical works.

A spokesman for the British Iron and Steel Federation said: "The Federation regrets that the re-rating of industrial property, which will increase the burden of steelmaking, should be introduced at a time when the Government is urging upon industry the need to expand trade in increasingly competitive markets."

"What is profoundingly disturbing about the Bill," Col. E. R. Mayer, president of the National Union of Manufacturers, commented, "is the provision enabling the Minister to de-rate residential property if he finds it necessary or politically convenient. This cuts directly across the main principle of the Bill and can only be done at the expense of other classes of ratepayer—almost inevitably industry."

Proposals suggested to the Minister by the Federation of British Industries for smoother and more equitable operation of the Bill, are: (a) relief given to householders should be reduced in five equal annual stages from 1963 to 1968 so that it is smoothly brought to an end in 1968, and (b) the present 50 per cent. of de-rating of industry should be similarly tapered down between 1963 and 1968 and thus ended in 1968. The Minister, himself, they point out, has adopted this "tapering principle" in his proposal for the re-rating of scientific societies.

AFS Congress and Exhibition Rules

The American Foundrymen's Society has announced that San Francisco, the site for its 65th national castings exposition and congress next May, has become the first major city in the United States to agree to a set of service principles to correct or eliminate practices which have spiralled the costs of participating in industrial expositions in recent years. In Detroit, in conferences regarding the scheduling (for Cobo Hall) of the International Foundry Congress in 1962, officers of the Society revealed that the AFS had adopted a set of basic policies and "ground rules" for its expositions. Acceptance of these principles will govern the Society's decision on selection of all future sites for its conventions and expositions.

The basic principles are:—(1) Acceptance of full responsibility for all parties concerned to create and maintain a favourable atmosphere of conditions, costs and fair dealing for industrial conventions and expositions; (2) establishment and acceptance of primary obligations by those who sponsor and those who service industrial conventions and expositions, and (3) development of a system for daily control and adjustment of all questionable exhibit service-charges as they occur, instead of weeks after the event closes.

"Educational expositions," Wm. W. Maloney, AFS general manager is reported as saying, "now represent in the US an annual investment of $3 billion. New halls are springing up from Atlanta to San Francisco and from Dallas to Boston, yet the cost of exhibiting has risen to such a point that one can expect one of three possible actions by exhibitors. They will either have fewer operating and dramatic exhibits—the backbone of any exposition—; they will demand that expositions be held less frequently; or they will refuse to participate in expositions scheduled for costly and trouble-beset localities. Each of these would seriously jeopardize huge civic investments in new exhibit facilities. Apparently, in some exhibition halls charges for tradesmen's labour have absolutely no relation to published service rates and exhibitors have to approve service charges regardless of cost—even those clearly excessive and outrageous. Afterwards, they naturally condemn everybody: the community, the service groups, and the sponsors. "It seems obvious," Maloney points out, "that all parties have been at fault—sponsors, service organizations, exhibit labour, exhibitors themselves, exhibit halls, convention bureaux and civic officials. To correct these conditions takes co-operation by everybody and leadership and we at AFS want to assure all groups concerned—civic, labour, and business—of our full co-operation and assistance. We will also provide additional liaison manpower at expositions to facilitate co-operative observance of the ground rules from day to day, but there must be agreement on basic policies and ground rules in advance."

Moscow Trade Fair

Following reference in the JOURNAL (November 3) to the British Trade Fair in Moscow, Stone-Wallwork, Limited, 32 Victoria Street, London, report that they will be exhibiting a fully operational Shalco automatic shell core-making unit in Moscow. It will be shown on the stand of the parent company, Stone Platt Industries, Limited, who are also exhibiting textile machinery. It is interesting to learn that the Stone-Wallwork exhibit was specially requested by Russian technical organizations following several visits to England over recent years.

Polish Foundry Technology

The September issue of *Przeglad Odlewnictwa*, the Polish foundry journal, contains a number of articles of interest, for example:

"Foundry Defects and their Causes in Shell-moulded Motor-cycle Cylinders," by P. Januszewicz and T. Piwonski. As the title states, this paper describes the work undertaken by the authors to classify foundry defects arising when shell-moulding small, iron air-cooled cylinder castings. Different types of defects, their causes and suggested remedies are summarized in tables.

The second article in this issue is by Z. Falecki, entitled: "Possibilities of producing Pistons for Diesels in Polish Foundries." In this article production parameters and foundry facilities for producing a 320-h.p. diesel casting for a railway locomotive are given. The chemical composition and properties of the alloy designed for the production of pistons are discussed and results are summed-up when making such items in both sand and metal moulds. Also included in the article are technological consideration of pouring pistons into dies and the influence of heat-treatment on the properties of the components.

The final full-length article in the journal is entitled "Production of Rolls of Spheroidal-graphite Cast Iron with Indefinite Chill and Part-chill Rolls," by B. Raczynski. In the article, discussing the technology of producing such items, the author reports that, in the foundry described, molten metal is obtained from an acid open-hearth furnace with a capacity of 25 tons. The magnesium addition is made in a bell-covered ladle and inoculation of the iron is carried out with silicon-bearing alloy. Indefinite-chill rolls are poured into cast-iron dies coated with a thin layer of blacking. Part-chill rolls are poured into dies lined with a 10 to 15 mm. layer of moulding material. In conclusion, it is reported that rolls produced in this way gave adequate service "life."

Research and Development in the Machine-tool Industry

A joint announcement by the Machine Tool Trades Association and the Department of Scientific and Industrial Research states the main conclusions and recommendations of the DSIR confidential report on "The Research and Development Requirements of the British Machine Tool Industry," and the measures which have been agreed between the Government and the industry to implement the recommendations.

The main conclusions are that the industry would benefit from employing more specially qualified designers and engineers and that a substantial increase in training facilities would make a most important contribution to the technological development of the industry. The recommendations cover measures to increase concurrently facilities for education and research in the field of machine-tool technology.

The Machine Tool Trades Association has already announced the formation of a Machine Tool Industry Research Association and the DSIR is increasing the research effort in the machine-tool field at the National Engineering Laboratory. Both the industry and the DSIR are contributing to the development of schools of higher training and research at two universities and two colleges of advanced technology. In addition, the DSIR is considering proposals for the development of advanced machine-tool designs under contract.

Tricks of the Trade

An Example of "Do-it-yourself" Moulding Technique applied to the Solution of a Production Problem

By "Jacques"

The economics of moulding, and the need to improve the quality of the casting, led to a reconsideration of the method of making the grinder-head, shown in Fig. 1. Design factors, and the infrequency of orders, made the existing split-lengthwise pattern unsuitable to mount for machine moulding. A minimum of machining on the faces (a) and (b) was called for, and whilst the advantages of casting vertically, rather than horizontally, were evident, excessive rapping and pattern taper were for the same reasons undesirable. It was decided, therefore, to convert the pattern to a vertical flat-back by using a stripper-block and cover-core, which would allow for easy pattern draw with the minimum rapping, that was desired. This technique in which a stripping-plate and core-box is actually made by the moulder, can be applied to almost all deep parallel-sided patterns. This method improved the appearance of the casting under consideration by eliminating the horizontal joint-line. Also by making the recessed panelled monogram (c) as a core, rammed up in place, the definition of the lettering was enhanced without risk of metal wash. Generally, the overall appearance benefited immensely from the change.

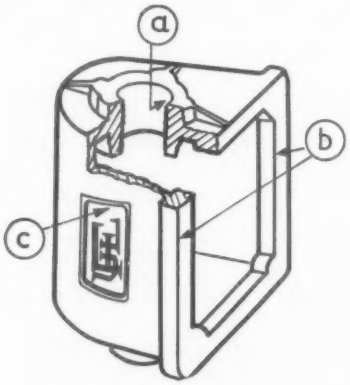

FIG. 1.—*Casting showing machined flange and bearing surface.*

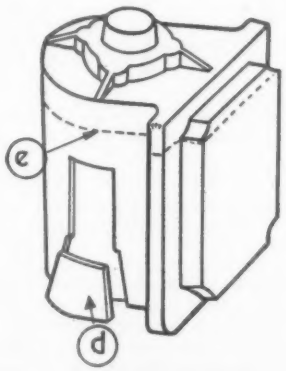

FIG. 2.—*Pattern reconstructed for vertical moulding with loose-piece, and showing dotted guide-line.*

Fig. 2 shows the one-piece pattern and illustrates the loose piece (d) which was rammed up in place, along with the panelled monogram core, and drawn into the mould later. The dotted line (e) was essential to the moulding of the master cover-core block and was marked clearly on the pattern as shown.

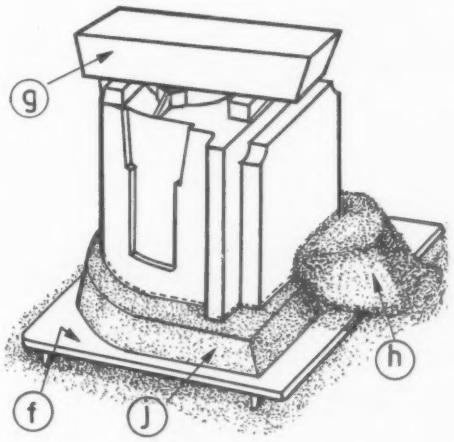

FIG. 3.—*Pattern supported in position by a weight (g) while the master cover-corebox block was made.*

Moulding Sequence

Fig. 3 depicts the first step in the operations with the pattern placed on end, on a level coreplate (f). The weight (g) was used to hold the pattern securely in place, during the tucking under of the pattern, to produce the master cover-corebox block, made in a strong-bonded coresand (h). The latter was hard-rammed, as indicated, and trimmed to a

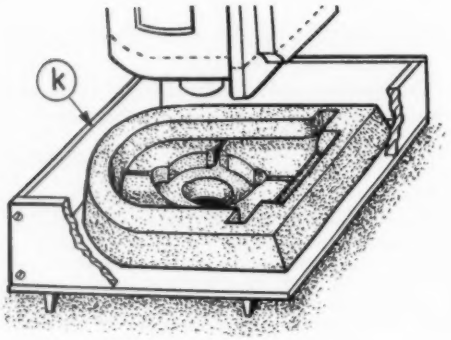

FIG. 4.—*First use of the block to produce the cover-corebox.*

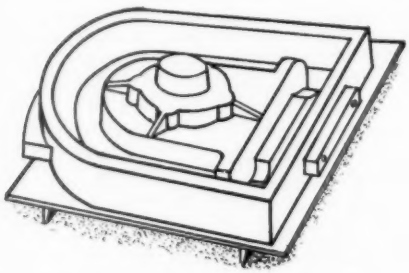

FIG. 5.—*Corebox in hard-setting material trimmed to shape.*

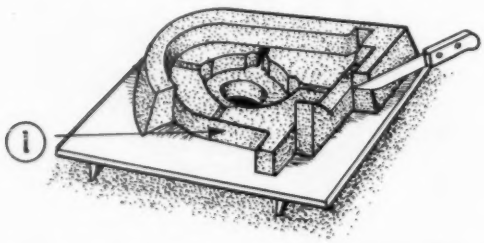

FIG. 6.—*Second use of cover-corebox block shown being trimmed to the contour of the pattern end.*

shape, clean, smooth and symmetrical, to the dotted line all round, shown—in part—at (j).

Fig. 4 shows the master cover-corebox block after the pattern had been lifted away. This block is oven-dried and blacked (or waxed), smooth all over, and after this treatment the screwed wooden frame (k) was put into place and the space rammed-up with hard-setting material. Just prior to the hard-set stage, the frame was removed and the surplus material trimmed away, as shown in Fig. 5. When hard and dry, the faces were varnished

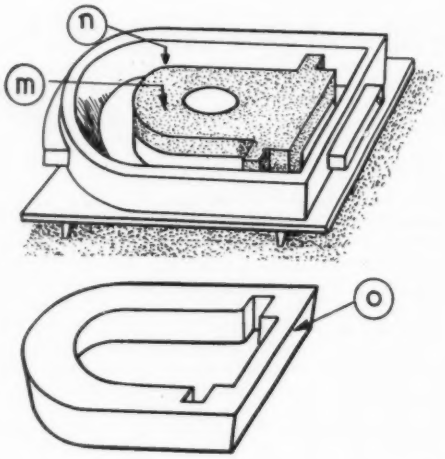

FIG. 7.—*Stripper-base made in the hard-set corebox with piece shaped in Fig. 6 used as "pattern."*

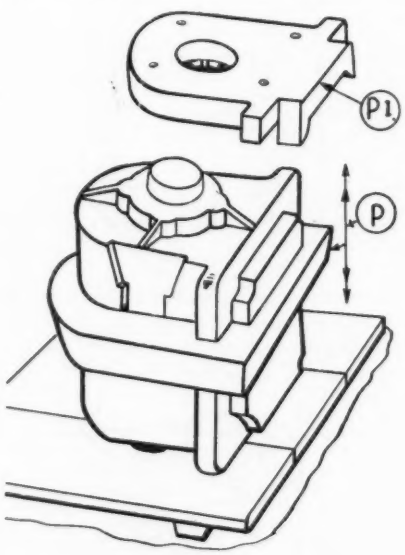

FIG. 8.—*Plaster stripper-base being checked for clearance of pattern.*

in the usual way. The section that had thus been produced, served as the cover-core corebox.

A core from this was then rammed up in the orthodox fashion and turned out on to a level coreplate, as shown in Fig. 6, and the surplus sand cut away to the pattern outline, as shown in part at (1). A shallow draft was produced on the side faces to allow for easy setting. This core was also

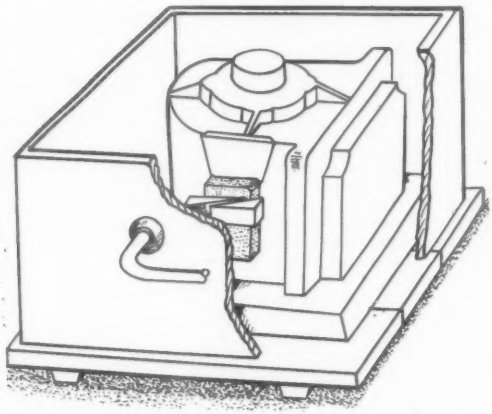

FIG. 9.—*Pattern with stripper-base in position set up for moulding, and illustrating method of securing monogram core.*

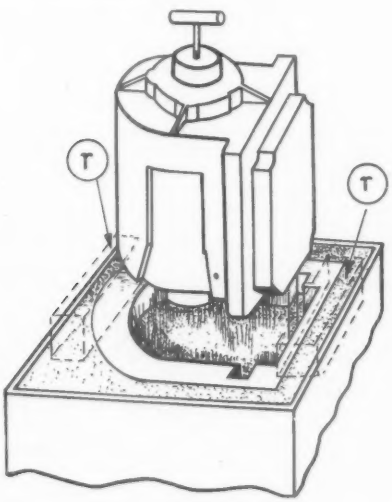

FIG. 10.—*Pattern being withdrawn from mould through stripper base.*

dried and replaced in the master cover-corebox, shown at (m) Fig. 7. The surface was waxed (or greased) to ensure a clean separation later, and the space (n) packed with hard-setting plaster. When it had set hard, this section provided the stripper base for the pattern as shown at (o) Fig. 7. After ensuring that this part was an easy sliding fit up and down on the pattern, as at (p) in Fig. 8, it was also smoothed all over and varnished. The loose section (pi) Fig. 8, could have been utilized, fixed permanently on to the pattern, if the latter had been inclined to move out of a vertical plane during the ramming-up.

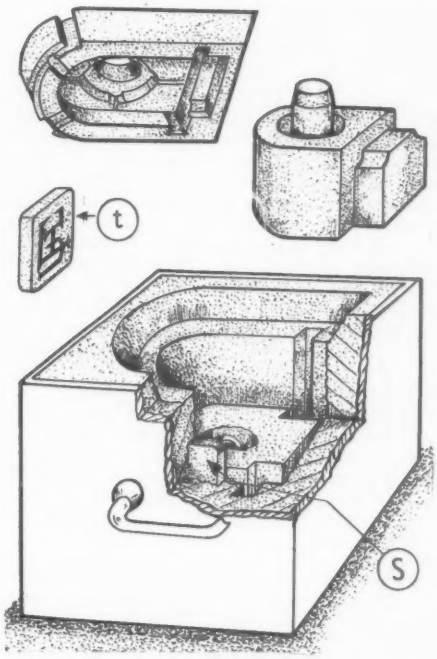

FIG. 11.—*Mould with stripper-base removed awaiting coring-up. Also illustrates how vertical moulding permits half-corebox to be used for body care.*

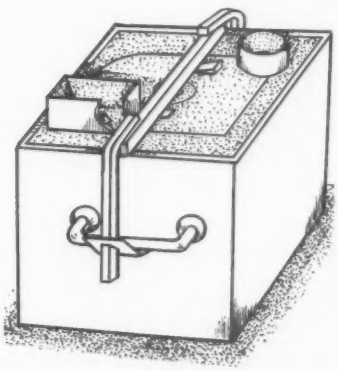

FIG. 12.—*Mould closed and clamped ready for pouring.*

Completion

Fig. 9 shows the single box-part moulding set-up with the pattern in position. The monogram core was secured in place during the first few courses of ramming, in the manner shown. When the box had been rammed-up and rolled-over, the pattern

Tricks of the Trade

was drawn through the stripper block as shown in Fig. 10—the base section has been left off in the illustration. Two weights (dotted lines (r)) were used to ensure that the stripper-block stayed firmly in place. The loose pattern piece below the rammed-up monogram core (not shown) was then drawn inwards, the stripper-block removed, and the mould cored up in the usual way, see Fig. 11. The monogram core, which is shown *in situ* at (s) in this Fig., and separately at (t), had a corner trimmed-off to match a similar chamfer on the pattern coreprint, to ensure that it would be rammed correctly into position. Fig. 12 illustrates the complete mould with push-on cramps, bar and wedges, and the runner and feeder-head bushes in place.

The simplicity of the single box-part loose-pattern production by the cover-core system, where intensive moulding production is uneconomical, will be readily appreciated from these easy-to-follow drawings and description. The moulder-made items described and durable and stand up as well to moulding-shop treatment as many other more-permanent materials.

Apprentice Training in British Foundries

Speaking at the annual prize presentation of F. H. Lloyd & Company, Limited, at Wednesbury, Staffs, last month, Mr. D. B. Benyon, the company's labour manager, urged the importance of apprentice training in British foundries. He said that the European Common Market was "looming on the horizon" and British firms would be competing with those in France and Germany in which countries there was a nationalized foundry training scheme. In France, boys of 13 were recruited and trained at schools and colleges and directed into the foundry industry. In Britain conscription was not viewed with favour and it was unlikely that a nationalized scheme would work which meant that the responsibility fell on the individual firm to train its own people. Too many firms, he said, relied upon the trained personnel of other firms to make up their strength. A firm should recruit and train people to meet its own requirements and responsibilities.

British Standards Institution

BSI News for November announces under the heading of New British Standards No. 758: Small domestic hot-water-supply boilers using solid fuel. 758 Part 2: 1960—Thermostat-controlled boilers, 7s. 6d. This applies to thermostat-controlled boilers with up to 10 sq. ft. of heating surface and with a working pressure of up to 52 lb. per sq. in., and designed to burn solid-smokeless fuel. A general specification, giving minimum design requirements, is given in section 1, minimum performance is defined in section 2 and methods of test are specified in section 3.

THE RATEABLE VALUE of Que Que, the Southern Rhodesia foundry centre, has doubled in the past eight years, the latest valuation and subsequent improvements bringing it up to more than £3,000,000.

New Foundry at Tunstall

Early last week, a new £25,000 non-ferrous foundry was opened at Ravensdale, Tunstall, in North Staffordshire. The works, which have been built by Wedgwood Foundries, Limited, to replace their original premises at Talke Pits, are in production and employ about 40 workpeople. Mr. James F. Dowell, president of the Stoke-on-Trent section of the Institute of British Foundrymen opened the new foundry and expressed the hope that it would make an ever-increasing contribution to the standing and importance of the industry. Officials of the firm hope to double the labour strength in the fairly near future, if they can get the men.

Mr. E. Smith, managing director, conducted visitors around the foundry after the opening ceremony. After paying a tribute to the architect and contractors, he told the visitors that moulding and coreblowing machines and shotblast equipment had yet to be installed, and it was hoped that the canteen and shower-bath facilities would also be completed early next year.

Before touring the works and entertaining visitors to luncheon at Federation House Potters' Club, Mr. Smith, who was accompanied by Mr. R. S. Lovatt, director and secretary, presented a china tea-service to Mr. Dowell as a memento of the occasion.

Founded seven years ago, the firm are suppliers to the Admiralty, the textile industry, diesel-engine manufacturers and the electric welding industry.

Peat-burning Stoves

The development of bogland in Ireland from a symbol of poverty to a source of national wealth, through the use of peat, was stressed by Mr. Joseph Brennan, T.D., Parliamentary Secretary to the (Irish) Minister for Finance, speaking at the presentation by Waterford Ironfounders, Limited, of the "Mona" domestic room-heater to the Press and trade in Dublin last week. The heater, developed in conjunction with Bord na Mona, the State sponsored Peat Board, has been specially designed to burn peat briquettes. Attractive in appearance and of a convenient size, the unit distributes heat evenly throughout the room, and is of the type which can be kept in overnight.

Those present at the function in Dublin included the Lord Mayor of Dublin, Mr. M. Dockrell, T.D.; Mr. Aodhagain O'Rahilly, and Mr. D. C. Lawlor, chairman and managing director respectively of Bord na Mona; and Mr. A. H. Masser, chairman and managing director of Waterford Ironfounders. Addressing the assembly, Mr. Masser acknowledged the co-operation of the Government and Bord na Mona in assisting in the development of modern appliances for the use of peat. Peat briquettes, he said, were now being produced at the company's Derrinlough factory at the rate of 100,000 tons per year, and when a second factory came into production in February, 1961, output would be doubled. The company also displayed a Rayburn room-heater, which model has recently been modified to burn briquettes.

Manufacturing Rights: Shand & Jurs Company of Berkeley, California, and Whessoe, Limited, of Darlington, have concluded an extension to their mutual agreement giving Whessoe the exclusive rights to manufacture S & I tank fittings in France, and the exclusive rights to sell these fittings within the European Economic Community and the French Union.

Personal

Mr. J. FERDINAND KAYSER, F.I.M., has moved from Harrow to Alteryn, 14 Leigh Park, Datchet, Buckinghamshire.

Mr. JAMES BELL, formerly machine-tool designer for Giddings & Lewis-Fraser, Limited, Wellgate Works, Arbroath, Angus, has been appointed chief engineer for L. S. Starrett Company, Limited, Jedburgh, Roxburghshire.

Mr. NORMAN K. EASTON who has been appointed general manager of Shaw-Petrie, Limited, Glasgow, took up his duties on December 1. He was formerly a director of Alex. Stephen & Sons, Limited, shipbuilders, Glasgow.

Sir JAMES R. H. HUTCHISON has been appointed a director and chairman of Glenfield & Kennedy Holdings, Limited, in succession to the late Mr. HUGH COWAN-DOUGLAS. Mr. J. DOUGLAS LATTA has been appointed a director.

Mr. DEREK GILL-DAVIES, export sales manager of Firth-Vickers Stainless Steels, Limited, Sheffield, has returned from a round-the-world business tour. China was amongst the countries visited, it being his third visit to that country in 18 months.

The Minister of Power, with the approval of the Prime Minister, has appointed Mr. M. P. MURRAY, C.B., to be a Deputy Secretary in the Ministry in succesSion to Sir REGINALD AYRES, K.B.E., C.B., who will be retiring from the public service on January 2, 1961.

Mr. S. H. NEWMAN, who recently relinquished the chairmanship of E. V. Industrials, Limited (parent company of Farrar Boilerworks Company, Limited, Newark, Notts), has now retired from the board in order to devote more time to private affairs.

Mr. TOM C. FIRTH, chairman, has been appointed managing director of Brightside Engineering Holdings, Limited. Mr. AMBROSE FIRTH has retired as joint managing director after 45 years with the group. Mr. Firth, who continues as a member of the board, retired as chairman in June.

Mr. C. A. LEWIS has been elected a director and appointed general manager of General Stampers, Limited, and of Turley & Williams, Limited, both of the Industrial Estate, Bridgend, Glamorgan, and both subsidiaries of Sidney Flavel & Company, Limited, Eagle Foundry, Leamington Spa.

Mr. P. JARDINE, group financial controller of Metal Industries, Limited, has been appointed to the boards of two Metal Industries' companies: J. G. Statter & Company, Limited, switchgear manufacturers; and Minerva Mouldings, Limited, manufacturers of plastic mouldings, both of Amersham (Bucks).

PROFESSOR W. HUME-ROTHERY, O.B.E., F.R.S., of Oxford University, is to give a lecture on "The Theory of the Alloys of Copper" under the auspices of the Metal Physics Committee of the Institute of Metals. The meeting will take place at the Royal Institution, Albemarle Street, London, W.1, on Thursday, February 23, at 6.30 p.m. Visitors are welcomed; tickets are not required.

Mr. FRANK SANITER, director of research of the United Steel Companies, Limited, Sheffield, was decorated with the OBE by the Queen at Buckingham Palace on November 15. Mr. Saniter is a former president of the Sheffield Metallurgical Association, and was chairman of the committee responsible for the laboratories of the British Iron and Steel Research Association in Hoyle Street, Sheffield.

Mr. D. J. HAGGIE was presented with two armchairs on Friday, November 25, to mark his 45 years' service with the Sheffield Lighter Trades Employers' Association. The presentation at a luncheon party was made by Colonel W. S. TYZACK, chairman of W. Tyzack, Sons & Turner Limited, who succeeds Mr. Haggie as president of the Association. Mr. Haggie was formerly chairman of Spear & Jackson, Limited.

Sheffield University Council has conferred the title of Visiting Professor on Professor G. C. KUCZYNSKI, Professor of Metallurgy in the University of Notre Dame, Indiana, USA, who is visiting the Department of Refractories Technology. Dr. T. KUSAKAWA, Assistant Professor and Research Fellow of the Castings Research Laboratory, Waseda University, Tokyo, who is visiting the Department of Metallurgy, has been similarly honoured.

Mr. JACK DAVISON has been appointed managing director of Hawker Siddeley Brush (South Africa), Limited, and of the Switchgear & Erection Company (Pty), Limited, and chairman of Hawker Siddeley Brush (Central Africa) (Pvt), Limited, Salisbury, as from April 1, 1961. He succeeds Mr. FRANK A. VAUGHAN who is returning to the head office of the Hawker Siddeley group in London. Mr. Davison is at present managing director of Hawker de Havilland (Pty), Limited.

Mr. WALTER E. NORTON, of W. E. Norton (Machine Tools), Limited, London, has been elected president of the British Association of Machine Tool Merchants for the ensuing year in succession to Mr. ROLAND GIDLEY (Gidley Machinery, Limited), of Stretford, who remains on the Council as immediate past-president. Mr. C. OLDFIELD (C. & G. Oldfield, Limited, Paisley), has been elected vice-president and Mr. E. J. F. BRADLEY (Pidgen Bros. Limited, London) has been re-elected honorary treasurer. Mr. A. V. GRAVES, Mr. C. G. NEWBURY and Mr. H. WIDDOWSON have been re-elected to the Council. Mr. A. KISSACK and Mr. F. E. VERNALS have been elected to the Council for the next three years.

Obituary

The death occurred suddenly at Stratford-upon-Avon of Mr. ANTHONY HALL, formerly general sales manager of the Ford Motor Company, Limited, of Clifford Chambers, Stratford.

Mr. T. P. W. NORRIS, M.B.E., M.C., deputy chairman of George Kent, Limited, was killed in a motoring accident last month. He was 68 years of age. Prior to joining the Kent board in September, 1958, he was chief personnel officer of the Vickers Group, and before that labour manager of the Billingham Division of Imperial Chemical Industries, Limited. He was also a former president of the Institute of Personnel management.

Mr. LEONARD GODBER, M.B.E., general manager (services) of Newton Chambers & Company, Limited, Thorncliffe, Sheffield, since 1950, and a local director, has died at the age of 52. He worked for Newton Chambers for 37 years. He became personal assistant to Sir Harold West when the latter was appointed managing director in 1941, and secretary to the local board of directors. He was responsible for carrying out many developments in reorganization and in personnel work. Afterwards he became the company's general office manager and administered the estates and housing departments. He was the company's first personnel officer until 1951.

Equipment and Supplies

Shell-coremaking Unit

With the increased tendency to use shell cores the introduction of coremakers of unit construction would seem a logical step. Fig. 1, for example, shows how five basic units are bolted together to form the latest CMU shell-coremaking machine produced by Polygram Casting Company, Limited, Frant, Tunbridge Wells, Kent. The coreblower can also be used alone if a foundry already has a suitable oven. (Alternatively, the basic units (coreblower, oven feed, oven, knock-out (ejection) table, and corebox return grid) can be connected in arrangements to suit the desired foundry layout.)

When operated as shown, the units, it is reported, provide a complete coremaking installation with a single working level so that there is no lifting of hot core-boxes; they are transferred automatically into, through, and out of the oven. The cycle thus requires the coreblower operator merely to slide the box from the knock-out table to the 1½-in. dia. blowing orifice. Automatic pneumatic clamping, blowing with sand/resin moulding material, and unclamping follow in rapid succession—an interlock preventing blowing prior to the box being clamped. The operator then pushes the invested box across to the pneumatic transfer-arm (Fig. 2) which pushes it into the oven while the door is simultaneously raised. On its way to the transfer arm, the box passes over a grid through which any surplus moulding material drops by gravity to leave a hollow shell core. While the box is passing automatically into the oven, the operator repeats the investment cycles with the next corebox. An investment time normally of 10-15 sec. thus controls the overall output of the machine. For lower outputs, one operator can, it is stated, both blow cores and strip them from the box. Rotational speed of the oven table can be adjusted to provide the optimum curing time and additional flexibility is conferred, it is claimed, by precise thermostatic control of the oven, heated optionally by electricity, town's gas, propane or butane. This container holds about 50 lb. of moulding material when full and can be provided with automatic topping-up where justified by production requirements. The pneumatic clamp is arranged to adjust itself automatically to shapes and sizes of corebox up to a maximum height of 15 in.

Foundry Goggles

Chapman & Smith, Limited, Holders Hill Circus, London, N.W.7, announce that they are now marketing a goggle designed and tested in accordance with the findings of the sub-committee of the Foundry Goggles Joint Advisory Committee to the Ministry of Labour and National Service. The essential part of the goggle is its special lens assembly, consisting of two Celestoid lens—one 0.50-in. thick and one 0.80-in. thick—backed by a P.V.C. washer held into the goggle by a nylon screwed ring. Either clear or green lens are available. It is stated that the goggles have been tested to withstand impact of up to 390 ft. per sec.

Protective-coating Service

Plant for the application of a comprehensive range of anti-corrosion and protective coatings to heavy equipment up to 5 tons in weight, under factory conditions, has been installed by West's-Loyne, Limited, (a company jointly formed by W.G.I., Limited (West's Group of Industries), of Manchester, and Loyne, Limited, of Ashton-under-Lyne), at Norton Street, Miles Platting, Manchester. The plant, it is claimed, includes one of the largest fully-automatic shot-blasting cabinets installed in Britain and a large gas-fired oven for the sintering and stoving of coatings, or the heat-treatment of metals.

FIG. 1 (*alongside*).—*General view of five basic units forming the new Polygram CMU shell coremaker. (For clarity, the asbestos curtains at the outlet of the oven have been lifted, although they normally hang down to prevent loss of heat as the corebox is swept from the oven by the ejector blade.) The oven inlet door is also in the raised position.* FIG. 2 (*below*).—*View into the oven across the knock-out table, which can be fitted with quick-acting ejection gear to suit the coreboxes concerned*

Shaw Process Licensees Conference

Last year, Shaw Process licensees held a very successful conference in London and so the function was repeated this autumn. The venue this year was Paris, and the event attracted about 90 delegates, drawn from America, Great Britain, Japan, Spain, Italy, Germany, France and India. Prior to the opening of the conference, on Sunday, October 16, the licensees and their wives were entertained to a buffet supper by Mr. M. Herzmark, at his home in Passy. Mr. Herzmark heads the Shaw organization in France and he also presided at the opening technical meeting on October 17, in the premises of the *Ingenieurs Arts et Metiers*—an ideal centre, with an excellent suite of lecture theatres and full club-facilities for the visitors.

Melting Furnaces

An early paper presented was by Mr. G. P. Welch, of the Wolverhampton Die Casting Company, Limited, who dealt with the indirect-arc and the high-frequency electric-melting furnaces for the making of steel for use in the Shaw Process. He insisted that the question of "paper" economics was not the only consideration. The high-frequency furnace, under British conditions, he said, was the most generally used for melting tool-steel as it was the most economical, but it was doubtful whether the quality of melt was as good as that made by the indirect-arc furnace. Much of the cast-steel items produced in the Wolverhampton foundry was for production of dies for the firm's die-casting production, the internal surfaces of which needed to have a high polish. Many steels which had to withstand high temperatures, when melted in high-frequency furnaces, and then produced in bar form, were quite incapable of receiving a high polish, due to microscopic inclusions. Freedom from these was, to-day, of major importance in the die-casting industry. The inclusions were due to the circulation and movement of the charge causing scouring of the lining. Steels melted in indirect-arc furnaces were by no means free from microscopic inclusions, but polishing tests had revealed that microporosity is generally much reduced, Mr. Welch said.

The plant installed in the Shaw Process foundry, at Wolverhampton included both types, the Author continued. The high-frequency furnace was rated at about 40 kw. and had a nominal capacity of 88 lb., but in practice easily took 100 lb. The indirect-arc furnace was of 50-lb. capacity and was rated at about 25 kw. under load. Working intermittently and using the high-frequency furnace, no warming up time was necessary as was essential with the arc furnace, and 100 lb. of steel could be melted in about 70 min. The material used for this small furnace was mainly bar stock—pieces of from 1 to 2 in. diameter, as large pieces were ruled out—a limitation not encountered in the arc melting furnace. Clean melting stock was desirable to avoid contamination and even a warming-up period contributed to extra oxidation of the exposed surfaces. Skimming was more easily carried out in the high-frequency furnace than with the arc furnace, which produced the finest surfaces in the cast products and if continuous melting could be practised, this furnace was to be preferred.

Compositional Changes

Carbon pick-up had been experienced when using direct-arc melting methods for steel, but the Author said he had found the reverse to be true. The figures set out in Table 1 show the results of melting 40 lb. of clean stock supplied by Richard Carr, which was subsequently cast into test strips at 1,600 deg. C.

TABLE 1.—*Compositional Changes when Remelting Bar Stock in an Indirect-arc Furnace (per cent.).*

	Before melting.	After melting.
Carbon	0.42	0 34
Silicon	0.71	0.78
Manganese	0.34	0 28
Chromium	5.21	4.18
Molybdenum	0.92	0.71

A second test was carried out using stock from Willan of Sheffield, based on specification H 13. Three batches from stock melted and cast at diminishing temperatures were prepared and a fourth was made up from equal parts of returned scrap and bar stock. No preheating of the metal was practised. The results are shown in Table 2. These illustrate that the greatest losses of carbon and chromium were associated with the highest casting temperature. As a result of these tests, preheating of the stock was discontinued at the Wolverhampton works and it was decided to charge at room temperatures, provided the metal was moisture-free.

TABLE 2.—*Compositions (per cent.) of Metal resulting from using Stock Melted at Different Temperatures (Second Series).*

	Carbon.	Silicon.	Manganese.	Chromium.	Vanadium.	Molybdenum.
Original ..	0.39	0.50	0.23	5.49	1.22	1.41
Cast at						
1,620 deg. C	0 30	0.61	0.20	5.22	1.22	1.45
1,560 deg. C	0 37	0 68	0.24	5.29	1.22	1.26
1,520 deg. C	0.36	0.60	0.22	5.37	1.22	1.20
Half scrap/ half stock	0.34	0.54	0.24	5.28	1.22	1.37

Finally, the Author made a comparison between a conventional steel foundry and a tool-steel melting shop, using furnaces of up to 1-ton capacity and contrasted the happy-go-lucky methods with the care taken in precision-investment-casting foundries. In conclusion the Author said that many established Shaw Process licensees would appreciate the points mentioned, but at Wolverhampton the melting process was regarded as being the most important stage in the making of castings with real precision.

Other Papers Presented

Other excellent papers were presented to the various technical sessions. One from Mr. Hersant of Marlyd—a firm operating a Shaw Process foundry on the outskirts of Paris—dealt with the casting of 13 per cent. chromium steel which is used for corrosion-resisting purposes. He detailed the mechanical properties of the castings produced and gave information about possible surface defects and their elimination. Apparently, quite a few of the licensees make this class of steel and a worthwhile discussion ensued.

Mr. R. J. Hammond of Blackburn Aircraft, Limited, illustrated his talk on the casting of aircraft wind-tunnels with a film. A very interesting annotated lantern-slide talk was given by Mr. R. Christensen of the Wisconsin Pattern Works in America. He showed how a concern employing about 50 people had installed the necessary electric furnaces and used the Shaw Process successfully for the production of metal patterns. A somewhat similar paper was given by Mr. Irwin Lubalin of the (American) Shaw Process Development Corporation, but covered a much wider application of the process. Dr. O. Madona of the Riken Piston

Shaw Process Licensees' Conference

Ring Company, Limited, of Japan, outlined the results of a research programme which had given remarkably fine results.

The Conference was extremely fortunate to have the services of Mr. H. J. Marshall of the Marlyd concern who not only interpreted French and English with equal facility, but being very familiar with the Shaw Process was able to clarify the statements made. (A third international meeting of Shaw Process licensees is being planned for next year.)

EEA Apprenticeship Scheme

A new scheme of apprenticeship for small- and medium-size firms, to be operated by the Engineering Employers' Association, has been devised to provide more engineering apprenticeships to meet requirements of the expected "bulge" in the number of school-leavers next year. Firms which find it impracticable to run their own apprenticeship schemes are being asked to pool their training resources. Already two group training schemes have been started, at Smethwick and West Bromwich, following discussions between the Association and branches of the National Union of Manufacturers.

The groups organized on a district basis will consist of up to 10 firms engaged in different types of engineering. Each group will be controlled by a training committee composed of representatives of member-firms, a representative of the local technical college and the local youth employment officer. Each apprentice in the scheme will spend at least the first 24 and the last 18 months of his training with the firm sponsoring him. For periods in his third and fourth years of training he may be transferred to other firms in the group. Participation in the scheme is to be free to member firms of the Association. Other firms are also invited to take part but will be charged an annual ten guinea service fee.

Industrial Films

The Central Film Library, Bromyard Avenue, Acton, London, W.3, announces the following films amongst new releases:—

In the Hot Zone (three reels, running time 25 min. in colour). Made by the Carborundum Company, Limited, the film details the super-refractory materials made by the company from silicon carbide and fused alumina, their properties (refraction, conductivity, resistance to pressure and absorption) and their uses in furnaces, retorts, crucibles, pottery kilns, etc.

Industrial Electric Heating (three reels, running time 30 min.), made by the British Electrical Development Association. The film (in colour) describes the four basic methods of electric heating—resistance, arc, induction and dielectric—and their application in numerous processes.

Latest Foundry Statistics

Light-alloy Castings: Belatedly the Ministry of Aviation announce that the production of aluminium castings during August amounted to 7,479 tons of which 1,534 tons were from sand moulds, 4,041 tons were gravity-die and 1,094 tons pressure-die-castings. This is a somewhat lower output than the monthly average, due in some measure to the incidence of holidays. The month's production of magnesium castings was 186 tons, which is well up to the average.

Iron Castings Production

Production of iron castings in the third quarter of this year was 903,700 tons, which compares with 802,200 tons in the third quarter of last year—an increase of nearly 13 per cent. Commenting on the Iron and Steel Board's production figures, the Joint Iron Council points out that output in the third quarter is not comparable with that of any other quarter owing to holidays being taken at that time. This factor, in general, would lead to a reduction in output of the order of 100,000 tons. So that after steadying slightly in the second quarter, ironfounding production, allowing for seasonsal changes, appears to have moved forward and to have established a record third-quarter level. Details of output, including both grey and malleable iron, by the main sections of the industry in the third quarter are shown in Table 1, together with figures for the similar period last year.

TABLE 1.—*Output of Iron Castings, by Section.*

Section.	Third quarter (thousand tons).		Percentage change.
	1959.	1960.	
Automobile (including tractors) ..	155.5	178.3	+14.7
Engineering (*a*)	256.8	296.3	+15.4
Building and domestic	123.1	121.9	− 1.0
Pressure-pipes (*b*) and fittings ..	125.7	122.4	− 2.6
Ingot moulds (*c*)	91.4	124.4	+36.1
Railway equipment	49.7	60.4	+21.5
Total	802.2	903.7	+12.7

(*a*) Including machine tool, textile machinery, electrical, shipbuilding, etc. (*b*) Mainly gas and water. (*c*) Mainly for the steel industry.

As is shown in Table 1, output of iron castings for building and domestic use was approximately the same as in the third quarter last year; production of pressure-pipes and fittings was slightly lower, but for all other sections a marked increase was recorded.

Of particular significance, states the JIC, is the firm situation in the manufacture of castings for the engineering industry where the current buoyancy of capital investment is exerting its effect. In the automobile section, the easing of demand for vehicles which has taken place had not generally been reflected in automobile ironfounders' production up to the end of September. The high rate of activity being maintained in the steel industry is reflected in the production of ingot moulds. The marked increase in the railway section reflects one of the periodic fluctuations of requirements under the modernization programme.

The Iron and Steel Board's figures for production by district are shown in Table 2.

TABLE 2.—*Production of Iron Castings by District.*

District.	Iron castings (tons).	
	Third quarter. 1959.	Third quarter. 1960.
Eastern, South-Eastern (incl. London), Southern and South-Western	91,840	102,250
Midland	185,610	203,400
North Midland	174,150	185,730
East and West Ridings	76,590	82,780
North Western	74,400	85,040
Northern	81,760	103,150
Scotland and Northern Ireland	72,030	82,790
Wales	45,800	58,570
Total	802,180	903,710

Notes from the Branches

Northampton Section

Thursday, October 20, saw the opening of the winter session of lectures of the Northampton section of the Institute of British Foundrymen, when Mr. L. Clarke, technical and quality manager of John Harper & Company, Limited, presented his paper entitled "Gating for the Production of High-duty Iron Castings."

This was Mr. Clarke's second visit to the section, his previous visit being some two years ago when he had presented his paper on "Surface Finish." The talk was well illustrated and was put over in a very practical style, being of considerable interest to every one of the 38 members present.

Mr. Clarke commenced by pointing out that all he had to say about gating would be taken into account if the following 22 questions were answered before work was started on the pattern equipment. This he said might seem a big task but in fact a number of the points were usually considered by most shops and regular observance helped to tidy up and regularize a rather hit-and-miss procedure. His list of questions was as follows:—

Questions

(1) Is it certain that there is no space wasted? or in other words are the pattern(s) in the best position?
(2) Will the mould cavity or cavities, fill up completely at normal pouring temperatures?
(3) If the pattern has a large flat face, is pouring speed correct (*i.e.*, 1 cwt. in 10-12 secs. depend-on size) to avoid scabbing of top side?
(4) Is there an efficient slag trap?
(5) With existing sand conditions will the flow of metal through the system cause swilling or erosion to mould or core?
(6) If pins or chaplets are used will they melt prematurely or not at all?
(7) Does the running system facilitate or deny gas escape from cores?
(8) Does the downgate position favour (*a*) comfort in pouring, (*b*) adequate weighting (if no clamps are used)?
(9) Can the running system be easily removed without breaking in or causing a fracture?
(10) Is grinding and dressing avoidably difficult and expensive?
(11) Are the thinner machined sections of the casting provided with hot metal or is there provision to run the cold metal off these sections?
(12) Are the heavy sections, which have to be sound, well fed? (*i.e.*, gating into a feeder may be advisable).
(13) Does the feeding system facilitate or slow down machine moulding? (*i.e.*, loose top feeders).
(14) Are the ingates on or near a machining location face?
(15) Is the pattern being gated to mould the critical face in the correct position?
(16) Will the running system, particularly the down gate, interfere with normal contraction causing cracking or warping?
(17) Is the yield satisfactory?
(18) If a pouring bush is to be used, is it of sufficient quality?
(19) Will there be excessive turbulence in the mould?
(20) Will the casting be subject to "strain" and is a flow-off necessary?
(21) What will be the effect of chills and denseners?
(22) Will all ingates function?

Discussion

Following the lecture a very lively discussion arose during which Mr. Clarke dealt with the following points:—

MR. FORD, after saying how much he had enjoyed the lecture, said he was interested in the running speed quoted of 1 cwt. of metal in 10-12 secs. which confirmed his own ideas of 10 lb. per sec. He said he realized that Mr. Clarke would be concerned with porosity and would be interested to know if mould hardness was thought to be important in obtaining sound castings.

MR. CLARKE said that over a period of six years he nad experimented in casting 4-in. cubes in a series of trials using greensand, dry-sand, and CO_2 moulds. He had repeated the experiments many times and had come to the conclusion that dry-sand moulds produced the soundest castings; it therefore followed that hardness of mould was of paramount importance in this connection.

North East Lancashire Section :

Members and guests at the annual dinner of the North East Lancashire section, held in October at the Keirby Hotel, Burnley. (From left to right) Mr. F. Lord, senior vice-president, Lancashire branch; Mr. H. Buckley, hon. secretary of the branch; Mr. D. Kershaw, president, North East Lancashire section; Mr. F. W. Nield, president, Lancashire branch; Mr. G. C. Studley, junior vice-president (Lancs); Mr. H. Tattersall, hon. secretary of the section, and their ladies. The event was adjudged a great success and the section has already arranged for next year's dinner to be held at the same hotel.

Notes from the Branches

MR. FORD observed that Mr. Clarke had tried to get as many castings as possible in a given moulding box size, and asked whether he thought there was a danger in so crowding a box part that it did not allow the sand so flow freely when machine moulding.

MR. CLARKE agreed that this was a possibility and that it was very unwise to be so bound by box size as to be unable to have sufficient sand round the patterns to produce a good, hard mould each time.

MR. ESPIN referred to the first question and asked whether the results obtained on the trial castings were as good for those made in CO_2 as those made in greensand moulds.

MR. CLARKE replied that unfortunately his method of making a CO_2 mould was to cover the pattern with CO_2 and to back it up with greensand, and under those conditions the casting made in CO_2 had not been equal to that made in dry sand. However, he said that had the mould been made completely in CO_2 sand, then he thought that the casting would have been equal to that made in the dry-sand mould.

Pouring

MR. DEATON asked if the lecturer would comment on the advisability of running a casting from the bottom as against a lip runner at the top.

MR. CLARKE replied that in his opinion if the mould and cores would stand it, top pouring was best especially if the job was to be fed from the top. If, however, bottom pouring was used then risers or feeders might be necessary. This might mean the casting would have to be left open which would encourage the entry of extraneous material. He observed, however, that each job had to be considered individually and it was inadvisable to make a general rule.

MR. STEVENS said that he had noticed that in a number of foundries the moulders cut the pouring basin in the top of the mould with a special tool. He had always thought this rather a slip-shod practice and would like Mr. Clarke's views.

MR. CLARKE said that he had never liked the practice of cutting pouring basins and would prefer to squeeze them in by the moulding machine squeeze head. He agreed that the practice could be a source of trouble from sand inclusions.

MR. DEATON referred again to the first question and asked if a greensand mould rammed as hard as a dry-sand mould would give improved soundness due to the tendency to chill from the moisture in the mould.

MR. CLARKE replied that he did not think that this was so and expected that the hard, greensand mould would improve the soundness as against soft greensand but would not be as rigid as a dry-sand mould. Moisture could have an adverse effect in hard-rammed greensand.

At this point the president had to cut short the discussion because of the time factor and a vote of thanks was proposed by Mr. Stevens, seconded by Mr. Espin, which was carried with acclamation.

Lancashire

Mr. W. J. Colton, chief metallurgist, Newton Chambers & Company, Limited, was the lecturer at the November meeting of the Lancashire branch of the Institute for which members assembled at the Midland Hotel, Manchester. Introduced by the president, Mr. F. W. Nield, Mr. Colton said his paper was in fact a summary of the IBF technical sub-committee's second report on "Mould Drying" which had been presented at the annual conference at Malvern last June (see JOURNAL, August 4, p. 142). He added that the findings of the committee, of which he was chairman, represented eight years of study of the problems involved. Mr. Colton then dealt with the report in three sections (1) heat transfer through sand, and moisture movement, (2) practical applications of these factors, and (3) assessment of depth drying.

Discussion

In the discussion which followed, one member said he was interested to hear that there would be a layer of wet sand behind the dry surface of the mould. He thought it would be possible to evolve a table to show the venting needed to counteract "strike-back." Mr. Colton did not agree that venting was needed, since permeability had only a slight effect on drying, whereas moisture at the back of the dried surface was most important. Another member noted that it took from six to 24 hr. to dry for a depth of 2 in. back from a surface, and the graphs had shown a levelling out after a certain time. Did not grain size and permeability have some effect on strike-back and what of capillary action, he asked? The lecturer replied that all depended on the amount of water in the wet "back."

The next enquiry came from a member who was concerned about the difficulty he had had in driving off the moisture from a mould which had a completely closed bottom and partially closed top. He was told that if the water couldn't get away it would drive itself back. Questioned as to how moulders—who were responsible for the drying of moulds—were to know how far back a mould must be dried, Mr. Colton said that the sub-committee had tried to show the fundamentals of mould drying and to establish principles that could be applied in any foundry. At present if two men had to make the same casting, they would not agree on the depth of drying. Possibly the best way to decide on drying depth would be to compile an information sheet from data supplied by founders themselves. The questioner's practice (of using a hose-pipe when drawing a pattern, then wet blacking the mould and finally washing it over) might be correct for particular circumstances, but the more moisture used the more drying was necessary. The quantity of water could be altered by changing the ramming density and steam removal was most important.

Loam Moulds and Venting

Drying of loam moulds in stoves was then dealt with, a member saying that in his foundry it was standard practice to bury two "probes" (bronze welding-rods) in the mould with two electrical leads taken outside the stove; a result equivalent to 6 per cent. of moisture had been indicated at the mould surface due to conduction of blacking, could this be avoided? In reply, Mr. Colton said it was best to use two lengths of probes, to ensure correct drying measurements, and the insulation of the leads must be able to stand up to the temperature of the dryer; he agreed about the difficulty due to conduction of blacking on the surface. Why was venting unimportant to drying was the next query, surely, said the questioner, it had some effect on conduction or radiation. Wire venting, replied the lecturer, did not make much difference to drying, it was the wet band behind the drying "front" which mattered most. Best results would be achieved if the water could be got away before it became steam. Drying temperature should not be above 350 deg. C. as at higher temperatures the sand bond might decompose; moisture movement however, depended upon temperature.

Asked whether an initial period of slow drying followed by a higher rate of drying would help to dry the moulds more quickly, Mr. Colton said he had not tried this practice himself but thought that if a "soaking" at 100 deg. C. were given first, then an increased temperature might have such an effect. A member then said he did not agree that mould breakdown might occur at temperatures above 400 deg. C. He had made a barrel-shaped casting in a mould straight from the stove and there had been no deterioration; if the mould had been allowed to cool before pouring then collapse might have occurred. He could not agree either with the statement that mould permeability had no effect on drying. Mr. Colton said it must be clearly understood that he meant permeability in the "green" state and not in the dry state; a temperature limit of 400 deg. C. was advocated to avoid destruction of the clay bond. Replying to another question about skin-drying of moulds, the lecturer said it was best in such cases to pour while the mould was warm, *i.e.*, hand hot, as when a mould was stone cold, moisture pick-up was more likely.

Here the discussion closed, and Mr. Colton was warmly thanked by the chairman for his able handling of the discussion.

Company News

BSA's Bid for Churchills

A bid for the capital of the Churchill Machine Tool Company, Limited, precision-grinding-machine manufacturers, of Altrincham (Ches), has been made by Birmingham Small Arms Company, Limited, the engineering and machine-tool group. The directors of Churchill announced at the end of last month that an offer had been received from BSA of 40s. cash for each 5s. ordinary stock unit and of £11 BSA 6 per cent. cumulative "B" preference stock for every £10 Churchill 6 per cent. cumulative preference stock.

The offer valued the £1,055,040 ordinary stock of Churchill at £8,440,000 and the £114,400 6 per cent. preference at £110,000 on the basis of the then current Stock Exchange price of 17s. 6d. for the BSA preference. The offer was made in a letter to the Churchill Machine Tool board dated November 23, and it is stated to be subject to the "usual conditions." The Churchill directors point out that the offer has not been invited by them, but that they will consider its terms and express their views to stockholders as soon as possible.

Churchill Machine Tool, which makes medium and light precision-grinding-machines, earned £307,000 after tax on the whole of its share capital for 1958-59, so that the £8,500,000 offer values the earnings on a 6 per cent., less tax, basis. The company's best year was in 1953-54 when it earned £378,000 net for dividends.

FOLLSAIN, LIMITED—All the issued share capital of J. R. Campbell (Engineers), Limited, gear-cutting specialists, of Slough, Bucks, has been acquired. The company will be operated in conjunction with the Follsain subsidiary, Varatio-Strateline Gears, Limited.

WOMBWELL FOUNDRY & ENGINEERING COMPANY, LIMITED—Very good prospects, having in mind the definite improvement in orders for constructional plating and steel work and for chilled and alloy rolls, were forecast by the chairman, Mr. Joseph Richards, at the annual meeting last week. The year had proved a record one as regards profit and turnover since 1954.

New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d.)

823,419. Siemens and Halske G.m.b.H., 12 Apostelgasse, Vienna, III, Austria.

Methods of subjecting molten metal to vibration or acoustic irradiation for de-gassing purposes. This Patent is an improvement of the company's previous invention described in B.P. 772,214 (FOUNDRY TRADE JOURNAL, May 23, 1957).

823,837. General Motors Corporation, Grand Boulevard, Detroit, Michigan, USA.

The manufacture of cast members for forming parts of combustion chambers, *e.g.* cylinder heads for internal-combustion engines. In particular, this invention refers to the formation of stress-relieving grooves in numbers of such members which, in use, are subjected to severe cyclic changes of surface temperature and to severe cyclic thermal expanding and contracting conditions relative to the other surfaces and interior portions of the member.

823,856. Imperial Chemical Industries, Limited, Imperial Chemicals House, Millbank, London, S.W.1.

Continuous-casting machines, which are intended to avoid defects which occur in the ingot such as surface tearing associated with the junction between the reservoir and the mould.

823,884. Nicholas Herzmark, Villa la Rustica, Clarens-Montreux, Switzerland.

A method of manufacture whereby it is possible to avoid the cracking which generally takes place around the main sprue of shell moulds after investment casting. This method also permits the easy handling of these moulds during manufacture, even when automatic or mechanical handling means are employed.

* * * * *

627,678: Notice is given that as a result of proceedings taken against it by Foundry Services, Limited, in the Chancery Division of the High Court of Justice, Harborough Construction Company, Limited, has submitted to an injunction restraining it from infringing the letters Patent No. 627,678, owned by Foundry Services, Limited. The Patent refers to exothermic products sold by Foundry Services, Limited, under the registered trade mark "Feedex." Certain of such products are further protected by Foundry Services' British letters Patent No. 744,490 and Harborough Construction Company, Limited, have also undertaken to refrain completely from the manufacture and sale of exothermic compositions with a fluoride content in the range of 0.1 to 10 per cent. Letters Patent No. 745,668 which covers the range of 0.1 to 0.75 per cent. fluoride, has been assigned to Foundry Services, Limited, by Harborough Construction Company, Limited. Harborough Construction Company, Limited, have paid the costs of Foundry Services, Limited, arising out of the proceedings.

ALBION MOTORS, LIMITED, Glasgow, have secured a further order from the Public Works Department of the Malayan Government for 30 Albion Chieftain tipping trucks, valued at more than £60,000. Bodies will be fitted to the chassis in Malaya. Earlier this year the company received an order for £320,000 worth of tipping trucks from the Malayan Government.

News in Brief

JOHN HOLROYD & COMPANY, LIMITED, engineers and manufacturers of worm gears and gearboxes, Milnrow, Lancashire, celebrate the centenary of their foundation this year.

MASSEY-FERGUSON, LIMITED, announce the purchase of a long-established Italian tractor company, G. Landini and Figli, S.P.A., which will give the farm machinery company entry into the growing Italian farm and industrial machinery market and an increased range of products for worldwide distribution.

THE EUROPEAN PRODUCTIVITY AGENCY OF OEEC (Organization for European Economic Co-operation) in Paris has acquired a copy of Wolf Electric Tools' film, "One Jump Ahead," for showing to engineering audiences throughout the areas under OEEC coverage. The film has been similarly recognized by the British Productivity Council.

THE NAME OF the Electric Resistance Furnace Company, Limited, a member of the EFCO group of companies, has been changed to Efco Furnaces, Limited. The change is due to the increased scope of the company's interests which were originally confined to electric resistance heating but now include both gas and oil-fired furnaces.

LITHGOWS, LIMITED, Port Glasgow, have secured a contract, worth more than £1,000,000, for a cargo ship of between 11,300 and 13,000 tons dw for H. Clarkson & Company, shipowners, London. Lithgows delivered a similar ship to these owners last year. The order has been placed at a fixed price and the ship is to be delivered in 1962.

THIS YEAR the Sheffield Smelting Company celebrated its 200th anniversary and to commemorate the occasion made a presentation of gifts to each of the employees of the parent company and its subsidiaries. Over 600 people took part in the scheme and according to their length of service received gifts ranging from gold watches to radio sets.

DURING THE WEEK ENDING NOVEMBER 4, the Distington Engineering Company, Limited, a subsidiary of the United Steel Companies, Limited, claimed to have set up a new British and European ingot-mould foundry output record with the production of 2,810 tons of ingot moulds, bottom plates, slag ladles and general engineering castings.

SIR STUART GOODWIN, the Sheffield industrialist, who opened Sheffield University's £85,000 gymnasium on November 25, promised to give another £35,000 to complete the plan for the University's indoor athletic campus. Sir Stuart and Lady Goodwin had previously given £30,000 towards the cost of the gymnasium and £60,000 for proposed swimming baths.

TONNAGE OXYGEN is to be provided to the Rotherham works of Steel, Peech & Tozer (branch of the United Steel Companies, Limited) by the British Oxygen Company, Limited. The supply will meet the requirements of Steel, Peech & Tozer's new electric-arc furnaces to be installed in their Templeborough melting shop under their current development programme.

GILBERT GILKES & GORDON, LIMITED, of Canal Ironworks, Kendal, are to close their iron foundry in January. It is the last iron foundry in Westmorland, and has been in continuous operation since 1856. The closure is taking place because the firm are now using greater quantities of fabricated steel parts and non-ferrous materials in their productions.

OVERSEAS REVIEW (November) issued by Barclays Bank D.C.O., announces that Scaw Tow Foundries, Limited, have in hand a £200,000 expansion scheme for the enlargement of their works at Kitwe, Northern Rhodesia. It is anticipated that part of the new plant will be in production by the end of the year. The full project is expected to take 16 months to complete.

COMMONWEALTH TECHNICAL TRAINING WEEK, sponsored nationally by the Duke of Edinburgh, is to be observed by Sheffield. The Sheffield city council parliamentary and general purposes committee on November 23 agreed to co-operate and to invite the help of all interested bodies. The Sheffield education committee will plan and be responsible for organizing the "Week."

THE PROVISIONAL PROGRAMME for the first International Congress on Metallic Corrosion is now available. The Congress, which promises to be an outstanding event, is to be held at the Imperial College of Science and Technology, South Kensington, London, S.W.7, from April 10 to 15, 1961. Details are available from the Congress Office, 14, Belgrave Square, London, S.W.1.

MR. SEIBEI ISHU, director and manager of the foreign division of the Fuji Bank, Japan's largest commercial bank, has spoken of the possibility of investing in iron-ore mining in the Philippines. Japanese steel mills, clients of his bank, are interested in the local industry and prospecting has been going on in Larap and other areas. Investment would be on a joint-venture basis.

TWO ORDERS, valued at a total of £330,000, have been received by the General Electric Company, Limited, from Albert E. Reed & Company, Limited. The orders cover two turbo-generators, a 10 mw. pass-out condensing set and a 7 mw. back-pressure set, both for installation at Aylesford Paper Mills, Kent. They form part of a general scheme for the expansion of steam and power plant on this site.

RADIATION, LIMITED, are now ready to build their new factory at Peterhead to manufacture water-heaters and electric cookers, all legal formalities having been completed. Allowances had been made for extension of the factory, which initially will employ between 40 and 50 people. Mr. J. Muirhead, one of the company's senior service engineers in Edinburgh, will be manager of the new factory.

THE FIRST STAGE in the plan for converting the city of Leeds into a smokeless area commenced on November 15 when occupiers of 4,000 dwelling houses in Central Leeds were advised that they must soon stop burning coal. Dr. Bradshaw, Leeds Medical Officer of Health, said it was hoped the conversion would be complete by 1980. The total cost of converting houses in the central area is estimated at £80,000.

DAVID BROWN CORPORATION, LIMITED, have obtained an order from the Soviet Union for high-grade gear-cutting machine-tools valued at £500 000, the contract being obtained in the face of very heavy continental competition, particularly from Germany. The machines, together with electronic accuracy control devices and other ancillary equipment, will be built at the company's machine-tool division in Manchester.

NEWTON CHAMBERS & COMPANY, LIMITED, have installed a new lighting system for the road from the main works entrance, where the lamps are electronically controlled. They are automatically switched on when the light intensity falls below a certain level; at the return of daylight the power is automatically switched off. The scheme was planned by Mr. J. V. Rodgers, electrical engineer, who recently retired from the firm.

MR. H. W. LOWNIE, JNR., addressing the annual meeting of the (American) Gray Iron Founders' Society

said that the American grey-iron foundry industry was only spending 0.03 per cent. of the industry's sales on research, whereas the average for American industry was 2.1 per cent. Great Britain he said was spending relatively seven times as much on research, and this applied also to the foundry industry.

SPEAR AND JACKSON, LIMITED, Sheffield, have agreed to collaborate with the Indian firm of Harbans Lal Malhotra and Sons in the manufacture of circular wood-cutting saws. Steel in semi-manufactured form will be sent out from Sheffield. The saws will be made in semi-mass quantities to meet a growing demand from Indian craftsmen. They are not of the range previously exported to India by Spear and Jackson.

STRUCTURAL ALTERATIONS at the Brinsworth depot, near Rotherham, of the British Oxygen Company, Limited, to be completed this month, will mean that cylinders of industrial gas will not have to be moved by night. Local residents have been protesting against the clanging noise made at night by the loading of the cylinders on to lorries. The firm has done its utmost to help, making the loading bay of wood and rubber to eliminate noise, and consulting lifting equipment firms. The matter was taken up with Rotherham Rural Council a year ago.

THE BOARD OF TRADE announce that as from May 1, 1961, higher fees will be charged for applications and registrations, and also in respect of trade marks due for renewal on or after that date. Before any changes are made an opportunity will be afforded for anyone to make representations against the increased fees. Copies of the Draft Rules introducing the new fees may be obtained from the Sales Branch, Patent Office, 25, Southampton Buildings, Chancery Lane, London, W.C.2, or from H.M. Stationery Office, Kingsway, London, W.C.2, and branches, price 3d. (by post 5d.).

REPORTS OF LARGE-SCALE REDUNDANCY at one of Derby's biggest factories, Ley's Malleable Castings, Limited, have been officially denied by the management. A personnel officer, commenting on rumours that 700 men were to be sacked, explained: "The true fact is that 19 labourers—17 Indians, a Jamaican and a Hungarian—have been discharged because of a slight recession in trade. There has been no suggestion of sackings in the near future." He added that the men affected were engaged in August as temporary labourers, and there was no question of victimization because they were coloured.

THE INSTITUTION OF PLANT ENGINEERS is holding a symposium on lubrication engineering to be held on March 23, 1961, in the Meeting Hall of the Institution of Mechanical Engineers. The symposium will consist of four papers and reprints will be available before the meeting. After the presentation of each paper adequate time will be allowed for discussion. One of the papers is on "Lubrication Engineering and the Steel Industry" by Mr. H. Harber, B.SC. (ENG.), of the Steel Company of Wales. Limited. Details are available from the secretary, the Institution of Plant Engineers, 2 Grosvenor Gardens, London, S.W.1.

MR. D. SCORAH, works welfare officer at Samuel Osborn & Company, Limited, told a meeting of the Sheffield area industrial group of the Royal Society for the Prevention of Accidents, that the biggest problem in works safety often consisted not in discovering the cause of accidents or suggesting ways to prevent them, but getting managements to accept the findings. The main concern of the safety officer, he said, was the development of an attitude of mind. Welfare officers should set an example and always wear the appropriate safety clothing when visiting any part of the factory and encourage supervisors to set a similar example to the people in their own departments.

ACCORDING TO Dr. F. Meyer, chairman of the steel corporation (ISCOR), in South Africa, net profit for the year ended June 30 last, totalled £11,122,317 after taxation, as against £7,560,974 the previous year. Net sales value of all ISCOR products during the year was £58,014,696 (£47,610,168) and value of products exported amounted to £13,449,000. During the year, the Corporation attained the highest steel production in its history, 1,748,527 ingot tons—an increase of 51,649 tons on the previous year. On completion, next year, of ISCOR's current £56,000,000 expansion programme, which will raise annual production to 2,350,000 ingot tons, a new expansion project, costing about £300,000,000, will be started, and this, it is estimated, will raise output to 4,500,000 ingot tons per annum.

MR. JOHN HARE, Minister of Labour, speaking at the Industrial Training Council Conference at Church House, London, last week summed up his remarks by saying that the "bulge" in school-leavers presented an immense opportunity and challenge. Though there had been some encouraging signs it was by no means clear that this challenge was going to be adequately met. If industry failed to meet the challenge—if when the "bulge" came it would be seen that enough young people were not getting the opportunity of skilled training—then he foresaw that there would be such a demand for Government action that the basic doctrine, that the responsibility for training rested with industry, might be subject to pressure that would be very hard to resist. He thought this would be very unfortunate, and hoped, that all industries represented at the conference, both management and workers, would go back to their undertakings determined that the challenge of the "bulge" would be successfully met.

Recent Wills

SCOTT, ROBERT, managing director of the Atlas Steel Foundry & Engineering Company, Limited ... £15,854

BIRD, A. G., a director of West's Group, Limited, and managing director of West's Piling & Construction Company, Limited £52,119

BROADBENT, E. W., founder of the Longclose Engineering Company, Limited, Leeds, and joint founder of Charles H. Roe, Limited, Leeds £487,706

GRAINGER, W. M., director and secretary of Walter Somers, Limited, heavy steel forgers, etc., of Birmingham, and director of the subsidiary, Walter Somers (Materials Handling), Limited ... £7,050

HADEN, G. N., for many years chairman of G. N. Haden & Son, Limited, ventilating engineers, of London, W.C.1, president of the Institution of Heating and Ventilating Engineers (1938) and holder of its gold medal (1959) £288,273

SAVEKER, T. H., managing director of T. Saveker, Limited, brassfounders, etc., of Birmingham ... £36,908

ADAM, THOMAS, formerly a director of Brigham & Cowan, Limited, shipbuilders, of South Shields ... £199,086

ROBINSON, BERNARD, formerly assistant works manager at the Park Gate Iron & Steel Company, Limited, Rotherham (Yorks) £3,991

BOWDEN, SIR HAROLD, president and former chairman and managing director of Raleigh Industries, Limited, and a vice-president of the Federation of British Industries £932,457

WIDDOWSON, J. G., vice-president of the Neepsend Steel & Tool Corporation, Limited, Sheffield, and managing director of Jonas & Colver (Novo), Limited, also of Sheffield £131,066

CLARK, M. H., founder of the Thornaby iron and steel merchants, Henderson Clark, Limited, and twice president of the National Federation of Scrap Iron, Steel, and Metal Merchants £36,065

STEPHENSON, SIR JOHN, chairman of the Eastern Gas Board, 1949-59, former president of the Confederation of Shipbuilding and Engineering Unions, and a director of the Wholesale Coke Company, Limited £12,515

Translation Service

From amongst the most recently published lists of translations available from the Iron & Steel Institute (4, Grosvenor Gardens, London, S.W.1), the following have been selected as being of interest to founders. The price quoted is that for single copies, postage extra, there being reductions for quantities ordered. Readers writing for translations, or for further information, should mention this JOURNAL when doing so.

BISI 1711 REACTION OF METALLURGICAL WORKERS TO TECHNICAL INNOVATIONS. Jüres, E. A. *Stahl u. Eisen*, 1960, Mar. 31, pp. 429-437. (£4 10s.) This is a contribution to the European Productivity Centre. To sum up this rather philosophical account it can be said that the workmen—in the majority of cases—do not mind changes, *i.e.* modernization, partly automation and the like, being introduced in their workshop, as long as they are informed beforehand and given the proper training for the new mode of operation. (*JISI* Abstract.)

BISI 1724 DR. FORSTER INSTITUTE (FOR NON-DESTRUCTIVE TESTING) RENTLINGEN. Förster, F. *Materialprüfung*, 1960, (2), pp. 65-68. (£3 10s.)

BISI 1754 "STRUCTURAL AND THERMODYNAMICAL FOUNDATIONS OF LIQUID METALLURGICAL SLAG REACTIONS." Negrescu, T. *Studii si Cercetari de Metalurgie* (Bucarest), 1958 (2), pp. 161-202. (£10.) Investigations into the constitution of liquid metallurgical slags have established quantitative relations regarding the ion groupings which form in the molten mass of silicates, and a general outline of the configuration and mechanism of some of these groupings of which some are chemically active whilst others remain neutral. Structural considerations not previously taken into account have helped to clear up some problems and to revise some ideas generally held regarding dilute and concentrated solutions. Similarly the concept of grouping has helped to clarify the idea of thermodynamical activity and justified the notion of an activity coefficient, although its shortcomings are seen in its unexplained variation as a function of the chemical composition. The author suggests a constant value which has to be subtracted from the analytical concentration in order to obtain the numerical value of thermodynamical activity. (Abstract *JISI*, 1959, April, p. 398c.)

BISI 1814 "INGOT MOULDS FROM NODULAR CAST-IRON." Körös, B. *Koh. Lapok-Ontöde*, 1959, April, pp. 111-113. (£3.) Russian experiments with about 0.7 ton ingot moulds from Mg-treated nodular cast-iron are reported in this paper. The chemical composition of the nodular cast-iron with the methods of production and heat-treatment is also given. A 150-160 per cent. increase in life, compared with that of ordinary ingot moulds, has been obtained. Ingot moulds from nodular cast iron have withstood more than 300 teemings. (Abstract *JISI*.)

BISI 1729 "TRANSPORT OF LARGE QUANTITIES OF MATERIAL AS AN ENGINEERING PROBLEM IN MODERN IRON AND STEEL TECHNOLOGY." Hüser, K. H. *Stahl u. Eisen*, 1960, Jan. 7 pp. 1-12. (£7.) Modern transport ideas and problems and their solutions are discussed and described. (*JISI* Abstract.)

BISI 1763 "INVESTIGATIONS INTO THE RECRYSTALLIZATION OF AN AUSTENITIC CHROMIUM-NICKEL STEEL WITH SPECIAL STRESS ON PROLONGED HEATING." Borchers, H., *et al. Arch. Eisenhütt.*, 1960, April, pp. 237-242. (£3 5s.) Hardness, structure and partial determination of the magnetic saturation of an austenitic steel, composed of approximately 0.02 per cent. C, 17.5 per cent. Cr and 12.5 per cent. Ni after up to 70 per cent. cold work and subsequent exposure for 24 hours from 20 to 500 deg. C and for 1 second to 2 hours from 500 to 1,200 deg. C. Discussion of test results. Compilation of a table for the determination of grain size as a function of both percentage work and reheating conditions. (Author's summary.)

BISI 1771 "CONTRIBUTION TO THE SPECTROCHEMICAL MICRO-ANALYSIS OF OXIDE INCLUSIONS ISOLATED FROM STEELS." Ludemann, K. F., *et al. Neue Hütte*, 1960, April, pp. 238-244. (£4.) This valuable method of metallurgical analysis, the first complete account of which was given 10 years ago, has developed in the meantime into an important aid in steel research. At the beginning of 1958 the Ferrous Metallurgy Institute of the Bergakademie at Freiberg therefore started isolating oxide inclusions in steels and studying them. A scheme of work was developed which enabled spectro-chemical micro-analysis to be carried out in industrial laboratories too. The following thus represents a contribution to quality control methods in the author's steelworks.

BISI 1809 "THERMOELECTRIC METHOD OF MEASURING THE METAL SURFACE LEVEL IN CONTINUOUS CASTING." Elkershausen, A. *Neue Hütte*, 1960, Jan., pp. 31-36. (£4.) The method described depends on the measurement of the rise in temperature of the mould wall, and has been used in a three-strand plant for several months. The possibility of combining the measuring equipment with a system for automatic control of metal level in the mould is discussed. (*JISI* Abstract.)

BISI 1816 "BRITTLENESS OF SPECIAL STEELS IN THE AS-CAST CONDITION: INFLUENCE OF IMPURITIES." Castro, R., and A. Gueussier. *Rev. Mét.*, 1960, Feb., pp. 135-148. (£7 5s.) The influence of structure and composition on the brittleness of an Ni/Cr/Mo steel and an austenitic Ni/Cr steel in the as-cast condition were investigated by means of temp-impact strength curves. Topics considered were: the effects of mould size, and hence the cooling rate on minor segregation and brittleness; influence of various impurities on intergranular brittleness in heat-treatable Ni/Cr/Mo steels; influence of a homogenizing thermal treatment on brittleness; and the effects of various impurities on the brittleness of as-cast austenitic stainless steels, together with the modifying influence on the results of the presence of 5 to 10 per cent. ferrite in the structure. (*JISI* Abstract.)

BISI 1833 "CONTRIBUTION TO THE PROBLEM OF THE LIFE OF STEEL MOULDS FOR CENTRIFUGAL CASTING." Bühler, H. *Stahl u. Eisen*, 1959, Nov. 12, pp. 1722-1730. (£5 10s.)

BISI 1834 "STUDIES ON THE LIFE OF STEEL MOULDS FOR CENTRIFUGAL CASTING." Königer, A., and W. Liebmann. *Stahl u. Eisen*, 1959, Nov. 12, pp. 1730-42. (£3 15s.) The experiments and the equipment used are described in detail. The temperatures measured during casting—particularly after repeated use—and the tensile and compression stresses observed are reported. Tensile strength of the steel does not seem to have any significant effect on the life of the mould, but it was obvious that notch-impact toughness has. Mo as alloying element has the greatest effect of all the elements studied on thermal-shock resistance. (*JISI* Abstract.)

BISI 1921 "THE GRANULATION OF REDUCING MANGANESE-BEARING SLAGS." Chikashua, D. S., *et al. Stal'*, 1957, July, pp. 611-615. (£4.)

BISI 1818 "DETERMINATION OF PORE SIZE-DISTRIBUTION IN REFRACTORY MATERIALS." Pampuch, R. *Prace Inst. Huln.*, 1959 (1), pp. 11-17. (£5 10s.) First the method of measurement and the principle of operation of the SK pyrometer are given. This is followed by considerations of distribution in various materials. It was found that there was a relationship between pores of about 14 μ diameter and slag resistance as well as between pores of about 3 μ diameter and compressive strength. (*JISI* Abstract.)

BISI 1828 "CONTRIBUTION TO THE DETERMINATION OF LOW-BORON CONTENTS IN STEELS." Leeb, A. J., and F. Hecht. *Radex Rund.*, 1960 (1), pp. 62-66. (£2 10s.) Boron is separated as methyl borate and determined photometrically with dianthrimide.

BISI 1888 SWEDISH PROPOSALS FOR DEFINITIONS OF TERMS USED IN HIGH-TEMPERATURE TESTING AND FOR THE CORRESPONDING ABBREVIATION SYMBOLS (IN PARTICULAR FOR STATIC LOAD TESTING). Engstrand, G. Int. disc. on long-time behaviour of high-temp. steels, Düsseldorf, June 24 and 25, 1960; Paper No. 34. (£1 10s.)

BISI 1893 EQUILIBRIUM OF SULPHUR REACTION BETWEEN LIQUID, CARBON-SATURATED IRON AND LIME-SILICA-ALUMINA SLAGS. Schenck, H., *et al. Arch. Eisenhüt.*, Aug., pp. 471-472. (£1 15s.) In continuation of an earlier work the investigation dealt with the effect of alumina in lime-silica slags on the sulphur equilibria with molten, carbon-saturated iron at 1,550 deg. C. It was found that alumina contents up to about 26 per cent cause no change in the equilibrium conditions hitherto assumed for CaO-SiO$_2$ slags. (Author's summary.)

BISI 1915 INFLUENCE OF COOLING RATE, HEAT-TREATMENT AND OF SOLIDIFICATION CROSS-SECTION ON ROOM-TEMPERATURE PROPERTIES AND ON CREEP BEHAVIOUR OF A CAST STEEL WITH 1 PER CENT. CR, 0.9 PER CENT. MO AND 0.3 PER CENT V. Gut, K., and H. Lüling. Int. Disc. on long time-behaviour of high temp. steels, Düsseldorf, 1960, June 24 and 25; Paper No. 17. (£3 10s.)

Translations in course of preparation include:—

BISI 1955 "METHOD OF DETERMINING THE TOUGHNESS OF METALS." Palmqvist, S. *Jernkont. Ann.*, 1957, 141, pp. 300-307.

BISI 1876 "DETERMINATION OF STRESSES IN WORKING METALS BY PRESSURE." Tarnovskii, I. Ya., *et al.* Metallurgizdat "The working of metals by pressure." 1954 (3).

BISI 1896 "CONTINUOUS CASTING IN AUSTRIA." Tarmann, D. *Radex Rund.*, 1959 (6), pp. 704-713.

BISI 1898 "PERMISSIBLE HEATING AND COOLING RATES OF THICK-WALLED PIPELINES." Grass and Wurker. *Allgemeine Wärmetechnik*, 1956 (10), pp. 211-219.

BISI 1918 "EFFECT OF HEAT-TREATMENT ON THE DEVELOPMENT OF CARBIDES IN CR/MO STEELS." Räcker, L., *et al. Mem. Sci. Rev. Mét.*, 1960, July, pp. 527-534.

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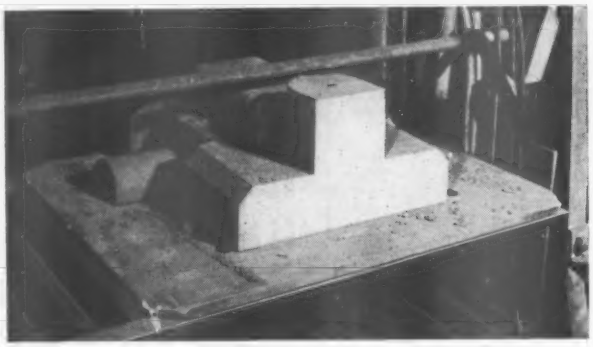

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Pig-iron and Steel Production

Statistical Summary of August Returns

The following particulars of pig-iron and steel produced in Great Britain are from statistics issued by the British Iron and Steel Federation. Table 1 summarizes activities during recent months. Table 2 gives production of steel ingots and castings in August. Table 3, weekly average production of finished steel in July. Table 4 gives the production of pig-iron and ferro-alloys in August, and furnaces in blast. (All figures are weekly averages in thousands of tons).

TABLE 1.—*Iron and Steel Index and General Summary of Pig-iron and Steel Production.*

Period.	B.o.T. Price Index, 1938 = 100.			Iron-ore output.	Imported ore used.	Coke sent to blast-furnaces.	Pig-iron, ferro-alloys prod.	Scrap used in steel prod.	Steel (incl. alloy).			
	Iron and steel.	Coal.	Basic materials[1]						Imports.[2]	Prod. ingots, castings.	Delivrs. finished steel.	Stocks.[3]
1958	343	503	478	276	262	227	245	196	9	369	284	2,242
1959	340	497	477	286	244	210	242	208	7	388	291	2,244
1960—May ..	338	483	488	337	317	261	299	252	27	475	393	2,248
June[4]	338	483	488	297	314	261	295	247	38	466	368	2,311
July ..	339	483	482	302	305	261	289	194	41	391	317	2,427
Aug.[4]	339	483	477	321	296	255	291	214	32	423	310	2,648

TABLE 2.—*Average Weekly Production of Steel Ingots and Castings in August.*

District.	Open-hearth.		Bessemer.	Electric.	All other.	Total.		Total ingots and castings.
	Acid.	Basic.				Ingots.	Castings.	
Derby, Leics, Notts, Northants, and Essex ..	—	4.8	15.7 (basic)	2.5	0.1	21.8	1.3	23.1
Lancs (excl. N.-W. Coast), Denbighs, Flints, and Cheshire	0.6	36.9	—	3.2	0.4	39.9	1.2	40.0
Yorkshire (excl. N.-E. Coast and Sheffield) ..	—	49.1	—	—	0.1	49.1	0.1	49.2
Lincolnshire	0.6	78.8	—	1.3	0.3	79.4	1.6	81.0
North-East Coast	1.1	46.9	—	2.8	—	49.0	1.8	50.8
Scotland	—	24.4	—	3.5	0.6	26.9	1.6	28.5
Staffs, Shrops, Worcs, and Warwicks	1.1	79.5	14.7 (basic)	0.6	0.1	95.6	0.4	96.0
South Wales and Monmouthshire	6.5	29.9	—	11.5	0.2	46.3	1.8	48.1
Sheffield (incl. small tonnage in Manchester) ..	—	—	4.4 (acid)	0.7	—	5.0	0.1	5.1
North-West Coast								
Total	9.9	350.3	34.8	26.1	1.8	413.0	9.9	422.9
July, 1960	9.6	317.6	36.7	25.7	1.8	382.6	8.8	391.4
August, 1959	6.9	284.9	24.1	19.6	1.6	329.4	7.7	337.1

TABLE 3.—*Deliveries of New Non-alloy and Alloy Finished Steel*

Product.	1958.	1959.	1959.	1960.	
			July.	June.*	July.
Non-alloy steel:					
Ingots, blooms, billets, and slabs[5]	4.6	5.1	4.2	5.3	3.7
Heavy rails ..	10.2	6.8	5.7	8.4	7.3
Sleepers	1.2	0.6	0.1	0.6	0.7
Fish and soleplates	0.7	0.4	0.5	0.6	0.5
Plates, 3 mm. thick and over:	47.3	43.1	32.2	50.6	35.6
Other heavy prods.	41.8	41.2	28.5	53.1	42.4
Ferro-concrete bars	7.6	9.6	10.5	12.6	10.7
Wire rods	21.5	23.5	17.8	29.1	20.4
Arches, etc. ..	8.6	7.8	5.7	8.4	6.5
Other light sections	29.1	33.0	26.6	40.7	32.2
Bright steel bars ..	6.2	7.6	6.6	9.4	9.0
Hot-rolled strip ..	22.6	27.4	23.3	33.9	27.4
Cold-rolled strip ..	7.0	8.0	7.1	10.0	8.7
Sheets, incl. coated:	41.7	47.0	40.2	52.3	47.4
Tinplate:	18.7	20.9	23.8	22.4	21.1
Blackplate	0.8	0.7	0.9	0.9	0.8
Tubes up to 16 in.	19.0	20.6	19.0	24.6	22.4
Tube fittings, etc. ..	0.4	0.4	0.3	0.4	0.3
Tyres, wheels, and axles	4.5	2.4	1.5	2.2	2.0
Forgings (excl. drop)	2.6	2.1	1.9	2.1	2.0
Steel castings ..	4.2	3.6	3.0	4.2	3.3
Tool steel	0.2	0.2	0.2	0.2	0.2
Total	300.5	312.0	259.6	372.0	304.6
Alloy steel	16.1	18.2	15.1	21.8	18.3
Total deliveries from UK production[6] ..	316.6	330.2	274.7	393.8	322.9
Add: Imported finished steel ..	7.0	7.1	8.0	30.4	38.9
	323.6	337.3	282.7	424.2	361.8
Deduct: Intra-industry conversion[7] ..	41.2	47.6	38.5	57.4	46.0
Total new material ..	282.4	289.7	244.2	366.8	315.8

TABLE 4.—*Production of Pig-iron and Ferro-alloys*

District.	Furnaces in blast.	Hematite.	Basic.	Foundry.	Forge.	Ferro-alloys.	Total.
Derbys, Leics, Notts, Northants, and Essex	20	—	31.6	18.1	0.1	—	49.8
Lancs (excl. N.-W. Coast), Denbighs, Flints, and Ches. ..	7	—	22.9	—	—	1.6	24.5
Yorks (excl. N.-E. Coast and Sheffield) ..	—	—	—	—	—	—	—
Lincolnshire ..	10	—	45.3	—	—	—	45.3
North-East Coast	18	2.4	59.3	—	—	1.3	63.0
Scotland	7	0.6	22.9	1.3	—	—	24.8
Staffs, Shrops, Worcs, and Warwicks ..	5	—	11.1	1.0	—	—	12.1
S. Wales and Monmouthshire	9	1.5	51.5	—	—	—	53.0
Sheffield	2	—	3.2	—	—	—	3.2
North-West Coast	7	13.8	—	0.8	—	1.1	15.7
Total ..	85	18.3	247.8	21.2	0.1	4.0	291.4
July, 1960 ..	84	23.0	237.5	24.2	0.1	4.1	288.9
August, 1959 ..	74	15.6	179.8	20.5	0.7	3.0	219.6

[1] Used in non-food manufacturing industries.
[2] Weekly average of calendar month.
[3] Stocks, mainly ingots and semi-finished, at the end of the year and months shown.
[4] Five weeks, all tables.
[5] Other than for conversion into any other form of finished steel listed.
[6] Includes finished steel produced in the UK from imported ingots and semi-finished steel.
[7] Material for conversion into other products also listed in this table.

British and World Shipbuilding

Lloyd's Register Returns for September Quarter

Steamships and motorships of over 100 tons gross under construction in Great Britain and Northern Ireland at the end of September, according to Lloyd's Register Shipbuilding Returns, totalled 262 ships of 1,753,843 tons gross. This is 112,445 tons less than the previous quarter and is the lowest figure since June, 1946. The highest post-war figure was 2,345,408 tons at the end of 1957. The total comprises 80 ships of 573,139 tons fitting out afloat, and 182 of 1,180,704 tons still to be launched.

Commenced during the quarter were 62 ships of 179,398 tons; launched, 53 ships of 267,468 tons, and completed, 61 ships of 297,072 tons.

Vessels under construction included 53 steamships of 916,876 tons and 209 motorships of 836,967 tons. In other Commonwealth countries there were under construction six steamers of 70, 231 tons and 40 motorships of 136,664 tons. Oil tankers building in Great Britain and Northern Ireland totalled 52 ships of 833,700 tons, which is 61,475 tons less than the June quarter. Total construction in the principal districts is shown in Table 1.

TABLE 1.—*Shipbuilding Construction in Hand in Principal Districts of Great Britain and Northern Ireland.*

District.	September 30, 1960.		June 30, 1960.		September 30, 1959.	
	No.	Gross tonnage.	No.	Gross tonnage.	No.	Gross tonnage.
Aberdeen ..	15	8,255	10	9,236	17	19,512
Barrow ..	3	92,500	3	92,500	2	67,500
Belfast ..	11	197,970	12	217,762	14	289,100
Bristol ..	2	1,930	4	2,830	2	3,844
Clyde:						
Glasgow ..	54	424,226	51	464,720	48	484,677
Greenock ..	19	134,488	18	128,728	23	160,620
Dundee ..	4	12,614	4	22,744	6	32,128
Hartlepool ..	2	22,250	2	22,250	3	25,710
Hull	33	12,938	36	14,753	43	15,621
Leith	6	42,220	7	43,050	9	40,826
Liverpool ..	7	92,540	7	130,045	13	130,857
Middlesbrough	8	146,010	9	162,610	9	137,632
Newcastle-upon-Tyne	33	331,440	32	323,580	33	391,476
Southampton	11	11,040	11	10,979	9	10,839
Sunderland ..	20	215,162	23	214,114	30	270,201

The sizes of steamships and motorships under construction in Great Britain and Northern Ireland included the following:—100 to 500 tons, steam nil, motor 93; 500 to 1,000 tons, steam 1 (16); 1,000 to 2,000 tons, steam 12 (16); 2,000 to 4,000 tons, steam 3 (3); 4,000 to 6,000 tons, steam 1 (3); 6,000 to 8,000 tons, steam 1 (25); 8,000 to 10,000 tons, steam nil (19); 10,000 to 15,000 tons, steam 8 (29); 15,000 to 20,000 tons, steam 3 (4); 20,000 to 25,000 tons, steam 5 (1); 25,000 to 30,000 tons, steam 8 (nil); 30,000 to 40,000 tons, 6 (nil); 40,000 tons and above, steam 5 (nil).

Apart from China, East Germany and Russia, from which countries no returns are available, there are under construction in the world 1,488 steamships and motorships of 8,811,416 tons, of which 19.9 per cent. is being built in Great Britain and Northern Ireland. The decrease of 312,759 tons since the June quarter occurs entirely in oil-tanker tonnage.

Of the steamships and motorships under construction throughout the world at the end of September, 4,564,149 tons (51.8 per cent.) are to be classed with Lloyd's Register. Of this total 1,711,729 tons, representing 97.6 per cent. of the tonnage being built there, are at yards in Great Britain and Northern Ireland.

FACTS AND FRICTION

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Raw Material Markets

Iron and Steel

The major alteration in the price of high phosphorus foundry pig-iron is causing concern since this iron is used mainly by foundries which for a long period have been short of work, including the light, jobbing and textile foundries, and it is feared that an increase in the price of castings will have a further detrimental effect on business. Competition for work is already very keen, and it is unlikely that the iron foundries will be able to bear the increase in the price of pig-iron coupled with the recent advance in the price of coke.

The recession in the motor car industry continues to restrict its usage of castings, and recent demands show a further reduction. The position is one of anxiety for the engineering foundries which supply this trade as the future trends of business are very uncertain. Some of these foundries are now engaged on a shortened working week, which is likely to be still further reduced unless additional work is secured. The vehicle and tractor section of the motor industry continues well occupied, and is utilizing large tonnages of high duty castings, as are also many other trades, and these in the aggregate represent a fairly substantial tonnage. The requirements of the engineering foundries for pig-iron are easily met by producers in all grades including low phosphorus, hematite, and refined irons.

The light foundries supplying castings to the building trades are fairly well occupied, but only moderate demands are being made by the domestic utensil trade. The jobbing and textile foundries are able to obtain reasonably good outputs but these again could undertake more work. The high phosphorus pig-iron used by these foundries is in good supply and more than adequate for present demands. Tonnages are available for shipment overseas, and consignments continue to be exported as and when orders can be obtained.

Up to the present the foundries have been able to cover their needs of scrap without much difficulty. There is, however, a lightening in the supply of cast-iron scrap, and special qualities are becoming more difficult to obtain. Foundry coke deliveries are satisfactory and ganister, limestone, and firebricks are in good supply.

The re-rollers continue well occupied and good demands are being made for most of their products, particularly for reinforcing bars. There is, however, some slackening in the demand for light sections, as well as for hot rolled strip and bright drawn bars, chiefly on account of the declining demands from the motor industry. The re-rollers have no difficulty generally in obtaining their requirements of mild steel semis. Many of them have fairly good stocks and home steelworks continue to send forward substantial quantities. Carbon and alloy steel semis are still in short supply.

Non-ferrous Metals

The copper market in London is active with the quotations for cash and three months metal showing a steady improvement. More than that, the outlook for the immediate future is now brighter than it has been for some months. Demand is being maintained at a very satisfactory level both in the UK and in Europe; the iron curtain countries have come into the market; rumours are circulating that a strike is imminent at Chuquicamata; difficult labour negotiations have to be overcome by the US-owned copper companies in Peru by the end of the year; and, finally, the conference in London over the future of Rhodesia and Nyasaland has injected an air of uncertainty in the market as to its outcome with the possible adverse effects on the Copperbelt.

Additionally, it is known that Japan has made an allocation of foreign exchange available for the importation of copper and copper scrap. All these bullish points considered, therefore, adds up to higher prices in the days and weeks ahead. The London market has also been helped by the news that copper stocks in London last week declined by 212 tons to 12,705 tons.

In the US, however, the market is only fair with the most active sector being that dealing with export copper which has helped the custom smelters to maintain their price level of 30 cents a pound. Producers are still maintaining their price of 30 cents a pound, although business has shown a steady decline.

Tin is quiet in London and in New York, but strong in Singapore which has helped to sustain the other two markets. The mid-term outlook for tin is still believed to be bright with a deficit of metal in prospect despite the difficulties experienced in the automobile industries of the world. Stocks of tin in LME warehouses rose 55 tons last week to 9,186 tons. In the US the price is steady at approximately $1.02 a pound.

Demand for lead in the UK is reasonably satisfactory and there does not appear to be too much metal available in Europe. In the US, on the other hand, a great weight of stocks overhang the market and there are reports circulating that metal imported into the country under the quota scheme is being sold on the market at prices below the existing level of 12 cents a pound, New York.

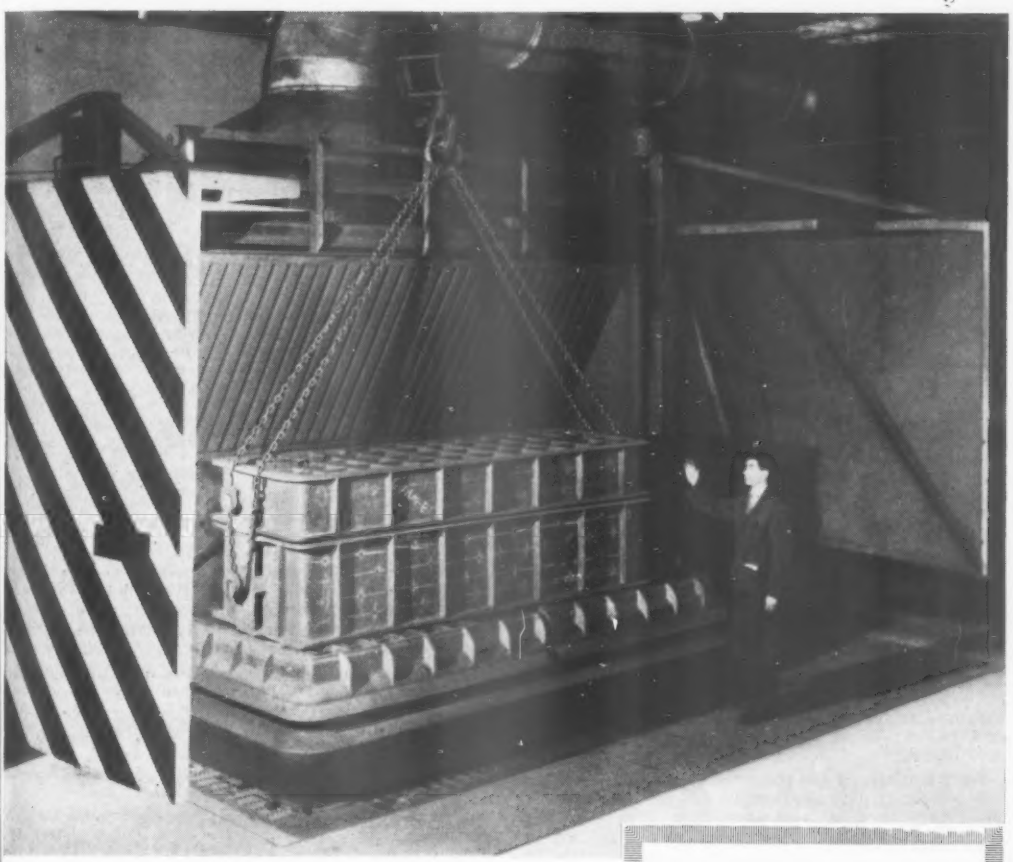
Zinc is a better market in London that in either Europe or the United States, yet demand has been markedly affected in the UK by the decline in activity in the motor-car industry. In the US, with the steel industry operating at about half rated capacity, production continues to outrun consumption and stocks are steadily rising. Moreover, the news that the long strike at the New Jersey Zinc Company's plants has been settled has not helped the market. The strike at Bunker Hill continues and no settlement is looked for this side of the new year. The US price is being maintained at 13 cents a pound for East St. Louis spot.

Publications Received

IWS Supervisor's Handbook and Diary, 1961. Published by the Industrial Welfare Society, 48, Bryanston Square, London, W.1; price 5s. post free.

It is suggested by the publishers of this handbook that firms employing a number of foremen should order a quantity of these very informative diaries and, at a small cost, have their names embossed on the front cover for distribution as gifts to appropriate staff. The information contained in the diary is indeed of the type needed by foremen and seldom, if ever, found assembled in one publication, so that the reviewer warmly endorses the proposed method of distribution.

ASSOCIATED ELECTRICAL INDUSTRIES (MANCHESTER), LIMITED—Mr. A. Cooper has been appointed comptroller in succession to Mr. E. Tankard who has retired. Mr. Cooper will also succeed Mr. Tankard as a member of the AEI accounts committee, as a director of AEI Finance Company, Limited, and as a director of New Era Electrical Manufacturers, Limited.



Baker Perkins Foundry Machinery at work... *at English Steel Castings Corporation Ltd.*

This shakeout unit has a working deck of 12 ft. x 5 ft. and takes a five-ton load. Under it are twin hoppers with a total capacity of 160 cu. ft. A plate feeder unit and Baker Perkins conveyor take the sand from storage at a rate of 80 tons an hour. No job is too large—or too small—for Baker Perkins—the firm with the complete range of foundry machinery.

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HISTORICAL NOTE

With a background of over 100 years in steel foundry practice, English Steel Castings Corporation Ltd. produces a wider variety of steel castings than any other steel foundry in the world (from a few pounds to 185 tons individual weight) and operates the most comprehensive plant in Europe.

Current Prices of Iron, Steel, and Non-ferrous Metals

(Basis prices, delivered unless otherwise stated)

December 7, 1960

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2, 10-ton lots or over: Middlesbrough, £21 17s. 0d.; Birmingham, £21 9s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.; North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si less than 2 per cent, S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over; N.-E. of England (local iron), £23 19s. 0d.; Scotland (Scotch iron), Zone S.1, £24 5s. 6d.; Sheffield, £25 9s. 0d.; Birmingham, £25 13s. 0d.; Wales (Welsh iron), £23 19s. 0d.

Basic Pig-Iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(per ton unless otherwise stated, delivered)

Ferro-Silicon (6-ton lots and over).—45 per cent. Si, £43 10s. 0d. to £46 0s. 0d., scale 15s. 0d. per unit, lumpy. 75 per cent. Si, £59 0s. 0d. to £63 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 20s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 11s. 8d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 14s. 8d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £81 10s. 0d. to £84 10s. 0d., basis 60 per cent. Cr scale 27s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £79 0s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale, 27s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent. C,* 1s. 8d. to 1s. 11½d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.10 per cent. C,* 1s. 9¾d. to 2s. 0¾d. per lb. Cr; 0.06 per cent. C,* 1s. 11d. to 2s. 1d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £275 0s. 0d.; 96/98 per cent., £285 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £61 10s. 0d.*

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 100 tons & over, £32 5s. 6d.; hard (0.41 to 0.60 per cent. C), 50 tons and over, £33 17s. 0d.; silico-manganese, 50 tons and over, £42 16s. 6d.; free-cutting, 50 tons and over, £35 4s. 6d. SIEMENS MARTIN ACID (50 tons and over): Up to 0.25 per cent. C, £40 11s. 0d.; silico-manganese, £43 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (50 tons and over).—BASIC: Soft, up to 0.33 per cent. C, £37 0s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £38 2s. 6d.; acid, up to 0.25 per cent. C, £41 14s. 0d.

FINISHED STEEL

Heavy Plates and Sections (50 tons and over).—Ship plate (N.-E. Coast), £40 7s. 0d.; boiler plates (N.-E. Coast), £42 17s. 0d.; floor plates (N.-E. Coast), £41 16s. 0d.; angles (N.-E. Coast), £38 1s. 6d.; joists (N.-E. Coast), £37 17s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 6d.; under 4 tons to 2 tons, £41 3s. 6d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £68 5s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £66 7s. 0d.; nickel-chrome, £97 1s. 0d.; nickel-chrome-molybdenum, £109 14s. 0d., in lots of 25 tons and over.

NON-FERROUS METALS

Copper.—Cash, £234 5s. 0d. to £234 10s. 0d.; three months, £230 15s. 0d. to £231 0s. 0d.; settlement, £234 10s. 0d.

Copper, Tubes, etc.—Solid-drawn tubes, 2s. 2¾d. per lb.; rods, 248s. 6d. per cwt. basis; 20 s.w.g., 283s. 0d. per cwt.

Tin.—Cash, £798 0s. 0d. to £798 10s. 0d.; three months, £795 10s. 0d. to £796 0s. 0d.; settlement, £798 10s. 0d.

Lead (Refined Pig).—First half December, £66 5s. 0d. to £66 10s. 0d.; first half March, £67 10s. 0d. to £67 15s. 0d.

Zinc.—First half December, £86 10s. 0d. to £86 15s. 0d.; first half March, £86 2s. 6d. to £86 5s. 0d.

Zinc Sheets, etc.—Sheets, 15g., and thicker, all English destinations, £122 7s. 6d.; rolled zinc (boiler plates), all English destinations, £120 2s. 6d.; zinc oxide (Red Seal) d/d buyers' premises, £100 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 10¾d. per lb.; sheets to 10 w.g., 203s. 0d. per cwt.; wire, 2s. 8¼d.; rolled metal, 203s. 0d. per cwt.

Brass (Brazing).—BS1400, B3, £177; B6, £227.

Brass (High Tensile).—BS1400, HTB1, £197; HTB2 £214; HTB3, £233.

Gunmetal.—BS1400, LG2, £221; LG3, £231; G1, ½%, £294; G1, 1%, £284.

Phosphor Bronze.—BS1400, PB1 (AID released), £313; BS1400, 90/10/1, £302.

Leaded Phosphor Bronze.—BS1400, LPB1, £243.

Phosphor Bronze Strip, etc.—Strip, 291s. 3d. per cwt.; wire, 4s. 0¾d. per lb.; rods, 3s. 4d.; tubes, 3s. 4d.; chill cast bars, solids 3s. 3¾d.; cored 3s. 4¾d. (CHARLES CLIFFORD, LIMITED).

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 10½d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 3½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 2¼d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 2¼d. to 2s. 3d. per lb.; Antimony, English, 99 per cent., £200 0s. 0d. Quicksilver, ex-warehouse, £70 10s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £186 0s. 0d.; aluminium bronze (BS1400), AB1, £248; AB2, £257.

* Average 68-70 per cent.

New Catalogues

Melting Furnaces. The covers of a 16-page brochure issued by the Monometer Manufacturing Company, Limited, Savoy House, 115/116, Strand, London, W.C.2, are particularly attractive in that the layout and choice of colours are really artistic. The brochure with clear line drawings and excellent illustrations, gives an up-to-date story of the present position of tiltable and rotary furnaces in the foundry and kindred industries. As fuel oil, creosote pitch, town and natural gas are suggested, presumably the burners are adjusted to the volume of the furnace, as each type of flame requires a different volume for its economic functioning. The brochure deals with iron and steel production, lead refining, aluminium melting, copper refining, and the production of non-ferrous alloys, such as bronzes, gunmetal and brasses, from scrap, swarf and residues. Illustrated descriptions are given of end-tilting rotary furnaces and an interesting picture shows the use of a mobile truck for charging this type of furnace.

Phosphating. In publication BH75A, issued by Hellermann, Limited, Gatwick Road, Crawley, Sussex, there is a large table giving a wealth of technical data as to how to tackle a large number of problems concerning the protection of metal surfaces, using the products of the company. The processes covered are identified by lettered numbers.

Jaw Breakers. Catalogue No. 470, issued recently by Hadfields, Limited, East Hecla Works, Sheffield, 9, covers jaw breakers—machinery made up mainly of specially-tough steel castings. It is a well-illustrated, nicely presented brochure, printed on art paper, and is quite outstanding as an example of engineering literature.

House Organs

Safety No. 10, the magazine of accident prevention and industrial health, published by the Accident Prevention Committee of the British Iron and Steel Federation, Steel House, Tothill Street, London, S.W.1.

In this issue it is reported that despite all the efforts made by the iron and steel industry, there has been an increase in the accident frequency rate since the autumn of 1959—the rate for steelworkers under 18 years of age being the highest since 1957. A new system of assessing the worth of posters as a means of accident prevention, described in this publication, is based not in terms of reduced numbers of accidents, but on increased conformity with safety-first tenets over a period. The phase covered in this experiment was the hooking-back of crane slings after use, for which three posters had been exhibited.

Foseco Foundry Practice No. 142. Issued by Foundry Services, Limited, Drayton Manor, Tamworth, Staffs.

In this issue, an account is given of porosity in a phosphor-bronze bearing, due to dissolved gas, the cure is then set out for this particular type of defect. A second article covers the use of strainer cores, whilst the last one deals with the modification of aluminium/silicon alloys.

Inco-Mond Magazine, No. 15, issued by Mond Nickel Company, Limited, Thames House, Millbank, London, S.W.1.

From the foundry angle, the most interesting article in this issue of the magazine deals with the use of s.-g. iron in the Fiat 500 car, for such components as crankshafts, rocker arms and shell-moulded camshafts.

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Imports and Exports of Iron and Steel in September

The following tables, based on Board of Trade returns, give figures of imports and exports of iron and steel in September this year. Totals for the first nine months of this year and last are also included.

Total Exports of Iron and Steel

Destination.	Month ended Sept. 30.	Nine months ended September 30.	
	1960.	1959.	1960.
	Tons.	Tons.	Tons.
Cyprus	289	1,243	1,345
Sierra Leone	1,219	7,917	4,731
Ghana	2,000	21,034	16,650
Nigeria	5,151	54,895	45,705
Union of South Africa	2,251	30,526	51,019
Rhodesia and Nyasaland	1,650	15,454	19,894
Tanganyika	1,530	15,241	11,213
Kenya	2,753	17,515	22,780
Uganda	152	3,268	1,050
Mauritius	1,052	1,088	4,012
Aden	443	2,205	2,076
Bahrein, Qatar, and Trucial States	1,221	5,984	11,026
Kuwait	167	7,944	5,041
India	16,161	138,483	200,679
Pakistan	4,063	30,605	51,816
Singapore	1,753	17,222	14,720
Malaya	1,463	7,868	14,160
Ceylon	1,581	31,347	39,445
British North Borneo	74	1,870	3,366
Hongkong	5,634	49,265	63,876
Australia	17,788	59,866	135,122
New Zealand	14,513	71,760	89,621
Canada	9,890	148,530	165,716
Jamaica	2,525	15,970	17,970
Trinidad	2,522	30,926	30,682
British Guiana	667	5,140	6,886
Other Commonwealth countries	2,224	26,942	27,008
Eire	5,719	35,401	46,285
Soviet Union	239	20,708	23,156
Finland	1,666	26,329	34,209
Sweden	13,163	89,170	130,541
Norway	7,573	68,679	84,219
Denmark	6,125	68,879	72,069
Western Germany	9,686	90,592	107,079
Netherlands	7,832	71,209	90,784
Belgium	1,610	27,973	25,843
France	729	2,532	5,688
Switzerland	1,444	6,657	10,284
Portugal	1,769	11,610	12,292
Spain	1,832	21,454	37,574
Italy	3,304	37,877	32,076
Austria	646	2,645	4,007
Yugoslavia	737	2,614	29,076
Greece	1,289	8,238	13,855
Turkey	1,919	4,469	11,576
Netherlands Antilles	87	1,992	2,781
Portuguese East Africa	330	1,176	3,536
Egypt	359	2,150	9,929
Sudan	569	5,721	7,256
Lebanon	826	2,369	1,667
Israel	1,224	11,299	15,155
Saudi Arabia	24	2,866	369
Iraq	4,486	58,070	32,560
Iran	2,193	23,246	48,876
Burma	205	6,646	4,801
Thailand	1,173	6,295	4,968
Indonesia	1,760	4,053	19,950
China	2,575	32,419	40,032
Japan	4,761	105,377	54,459
Philippine Republic	189	6,149	6,050
USA	8,405	133,846	163,978
Cuba	65	5,236	5,905
Colombia	440	2,773	6,591
Venezuela	1,975	54,293	28,438
Ecuador	74	811	2,128
Peru	402	1,994	4,928
Chile	136	1,069	3,280
Brazil	1,009	18,162	22,838
Uruguay	646	771	6,677
Argentina	5,733	161,918	65,089
Other foreign countries	18,293	58,092	106,449
TOTAL	225,977	2,125,937	2,496,912

THOS. W. WARD, LIMITED, Albion Works, Sheffield, announce their "Rails and Rail Accessories" catalogue is now in its sixth edition.

Total Imports of Iron and Steel

From	Month ended Sept. 30.	Nine months ended September 30.	
	1960.	1959.	1960.
	Tons.	Tons.	Tons.
Union of South Africa	1,015	18,239	23,969
Rhodesia and Nyasaland	268	4,056	5,123
Canada	50,035	13,309	197,875
Other Commonwealth countries and Eire	7,349	8,576	37,958
Soviet Union	1,150	41,787	27,590
Sweden	3,481	21,336	35,223
Norway	13,406	62,169	119,464
Poland	109	3,723	8,370
Western Germany	7,775	53,828	108,907
Netherlands	12,832	122,462	153,342
Belgium	9,138	16,871	91,663
Luxembourg	799	4,913	11,763
France	2,867	16,387	52,510
Italy	84	10,973	21,081
Austria	339	3,157	9,637
Japan	822	1,958	5,317
U.S.A.	18,857	19,551	314,733
Other foreign countries	31,214	9,345	122,155
TOTAL	161,540	432,640	1,346,680
Iron and steel scrap and waste, fit only for the recovery of metal	40,541	2,509	195,273

Exports of Iron and Steel by Product

Product.	Month ended Sept. 30.	Nine months ended September 30.	
	1960.	1959.	1960.
	Tons.	Tons.	Tons.
Pig-iron	9,340	104,905	121,095
Ferro-columbium (niobium)	7	39	85
Ferro-tungsten	105	869	743
Other ferro-alloys	1,815	6,008	8,222
Ingots, blooms, billets, slabs, sheet bars (incl. tinplate bars), and similar primary forms	418	60,087	21,685
Pieces roughly shaped by forging	99	1,176	775
Iron bars, rods, angles, shapes, and sections	104	1,581	1,283
Steel bars, rods, angles, sections, and shapes	39,878	320,964	463,537
Iron plates and sheets	—	287	527
Universal plates	1,502	7,379	14,877
Steel plate, 3 mm. and under 4.5 mm. thickness	2,672	30,159	30,755
Ditto, 4.5 mm. or more in thickness	23,847	142,936	256,301
Blacksheets and blackplate	21,990	199,507	221,801
Hoop and strip	8,500	61,718	76,419
Tinplate	32,549	349,746	378,786
Decorated tinplate	610	6,493	4,515
Galvanized sheets	7,343	65,004	62,356
Other (incl. tinned sheets, terneplate, and ternesheets)	2,147	16,179	19,949
Railway and tramway construction material	7,726	116,086	123,250
Wire rods of steel (incl. alloy steel)	4,402	35,957	41,952
Wire	8,102	78,469	88,497
Tubes, pipes and fittings	52,821	520,388	559,502
TOTAL	225,977	2,125,937	2,496,912

MOND NICKEL COMPANY, LIMITED, announce that a newly-developed 9 per cent. nickel-alloy steel has passed all laboratory tests and a large-scale determination of its suitability for use at low temperatures, *i.e.*, down to −196 deg. C. has been carried out.

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A special aggregate for special purposes

New!*

ALAG is a synthetic aggregate which, when used with CIMENT FONDU, PRODUCES CONCRETE WITH THE FOLLOWING UNIQUE PROPERTIES :-

EXTREME RESISTANCE TO ABRASION
(Hardness of aggregate 7·5 MOHS. Cuts glass)

ENORMOUSLY HIGH STRENGTH IN A MATTER OF HOURS
(For example 12,000 lb. per sq. inch at 24 hours and 16,000 lb. per sq. inch at 7 days)

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(up to 1,150/1,200°C.)

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CLASSIFIED ADVERTISEMENTS

PREPAID RATES: **Twenty words for 10/- (minimum charge) and 4d. per word thereafter. Box numbers 2/6 extra per insertion (including postage of replies). Situations wanted 2d. per word throughout.**

Advertisements (accompanied by a remittance) and replies to Box Numbers should be addressed to the Advertisement Manager, Foundry Trade Journal, John Adam House, 17/19, John Adam Street, Adelphi, London, W.C.2. If received by first post Monday advertisements can normally be accommodated in the following Thursday's issue.

SITUATIONS WANTED

FOUNDRY MANAGER, aged 50, A.M.I.B.F., light castings, light jobbing floor, mechanisation in all phases, shell moulding, grey and high duty irons, seeks a change. Box FM502, FOUNDRY TRADE JOURNAL.

FOUNDRY METALLURGIST, H.N.C. metallurgy, experienced in grey and malleable irons, desires position with foundry requiring hard working metallurgist with drive and initiative. Scope for future advancement essential. Any part of the country considered. Box FM990, FOUNDRY TRADE JOURNAL.

MODEL MAKER/Wood Pattern Maker requires position as Designer/Model Maker in any concern requiring prototype scale models. Box MM996, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

ASSISTANT TO FOUNDRY MANAGER required by Malleable Foundry in South Africa. Must have sound knowledge of Malleable Foundry practice. Good salary and contract offered to right man. British personnel already on our staff. Box AT960, FOUNDRY TRADE JOURNAL.

METAL PATTERNMAKER required by Malleable Foundry in South Africa. Must be good all-round man with working knowledge of Malleable Foundry practice. Good salary and contract offered to right man. British personnel already on our staff. Box MP951, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN wanted for progressive position in the Iron Foundry of a Machine Tool Works situated in the West Riding of Yorkshire. Applicants must have practical experience on Grey Iron castings of 2 tons upwards. Please give full particulars including present salary in strict confidence to Box FF953, FOUNDRY TRADE JOURNAL.

YOUNG Foundry Technician with experience in jobbing and mechanisation required for a Belgium Foundry to start as ASSISTANT MANAGER. Initiative and ability is essential, as after a suitable period of adaptation the position of Manager will become available. Write stating full qualifications and experience to Box YF954, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER required for Iron Foundry near the South Coast. Must be fully experienced in mass production techniques of moulding; also melting and metallurgical processes. State age, previous experience and employers, also salary required. Housing available. Pension Scheme. Box FM982, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

EXPANDING Non-ferrous Foundry require FOREMAN to take charge of all departments. Top salary for good man. Contact H. E. COXHEAD, STRATFORD FOUNDRY, 15 Martin Street, Stratford, E.15. Phone Maryland 1786/1491.

SITUATIONS VACANT—*contd.*

WANTED. Young keen man to act as ASSISTANT FOREMAN in Ironfoundry in West Midlands area. Previous experience in Cupola practice, and general progressing of foundry work is of an advantage but not essential. Please apply Box WY992, FOUNDRY TRADE JOURNAL.

SAND FOUNDRY SUPERINTENDENT

Required for well-established

LIGHT ALLOY FOUNDRY

situated in

MIDLANDS

Previous experience in similar position essential. Plant accommodates large machine moulding section, floor and bench moulding, together with core shop producing oil, sand, CO_2 and shell cores.

Position is of senior executive status and commands a good salary, which will be dependent entirely on the experience and qualifications of the successful applicant. First-class superannuation scheme in existence.

Applications, which will be treated in confidence, should contain full particulars of previous posts held, and salary range desired.

Please reply to: **BOX No. SF999,** FOUNDRY TRADE JOURNAL.

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Our Appointments Division has been asked to advise on the following post:—

SUPERINTENDENT ENGINEER

Ironfounders & Engineers

for an old established company in Central Scotland engaged in manufacturing a wide range of light castings. Responsible to the Board for directing and co-ordinating the activities of some 30 men in the Engineering and Maintenance Departments of a well-equipped mechanised Foundry. Candidates must have had extensive experience of plant and machinery maintenance in a responsible position. Foundry experience, though not essential, would be a distinct advantage. Qualities of drive and devotion to duty, coupled with the ability to handle men, are of great importance. Preferred age 35—45. Commencing salary up to £2,000 with Pension Scheme and life cover. (Ref. 4041/FTJ.)

The identity of candidates will not be revealed to our clients without their prior permission. For the convenience of clients and candidates we have Regional Offices in **Glasgow, Manchester, Bristol, Birmingham** *and* **Dublin** *but, in the first instance, applicants should forward brief details, quoting the reference number, to:—*

PERSONNEL ADMINISTRATION LIMITED

Appointments Division, 2 Albert Gate, London, S.W.1

SITUATIONS VACANT—*contd.*

ALUMINIUM LABORATORIES, LTD.

Research and Technical Service
Organization of the Alcan Group
of Companies

NEED A FOUNDRY METALLURGIST for liaison work to assist users of ingot alloys. A man with experience of most methods of aluminium founding and technical education to A.I.M. or degree standard is required. He should have the ability to deal with customers and the problems arising in their foundries in melting and casting and in the performance of such castings, for example, as regards strength, soundness and finishing characteristics. Apply: DIRECTOR OF RESEARCH, ALUMINIUM LABORATORIES LIMITED, Banbury, Oxon.

TWO SKILLED MOULDERS for Non-ferrous Foundry. Experienced in moulding high nickel alloy castings. Willing to work on iron when necessary. KELL AND COMPANY, Barton Foundry, Gloucester.

FOUNDRY

SERVICE ENGINEER required by well known Foundry Equipment Manufacturers. Preference given to applicants residing in the South West Midlands or Birmingham-Coventry area. Non-contributory pension scheme. Write stating age and full details of past experience to Box RB986, FOUNDRY TRADE JOURNAL.

SALES REPRESENTATIVE. Large engineering concern in the West of Scotland area requires a young energetic sales representative to promote the sale of iron and steel castings in the open market. Applicants should be fully conversant with all aspects of Iron and Steel Founding and have had previous sales experience in this field. Salary will be awarded in accordance with qualifications and experience. Apply Box SR963, FOUNDRY TRADE JOURNAL.

CATTON & CO. LTD. require a CHIEF RATE FIXER to take over a small existing rate fixing section and to build this up to efficiently cover steel foundry production departments making castings in the 1-10,000 lb. range. Steelfounding and rate fixing experience desirable and details of these, together with other relevant personal information, should be quoted when replying. The appointment is at Senior Staff level and as such will carry pension benefits. Assistance with housing will also be provided if required. Replies—which will be treated in confidence—should be forwarded to the TECHNICAL DIRECTOR, CATTON & Co. LTD., 29 Chadwick Street, Leeds, 10.

SITUATIONS VACANT—*contd.*

SENIOR FOREMAN for Moulding Shop with good technical experience in rainwater goods, engineering castings, estimating, etc. Pension Scheme in operation. Apply in writing, stating age, experience and salary expected to SECRETARY, LION FOUNDRY CO. LTD., Kirkintilloch, Nr. Glasgow.

PRESSURE Cast Aluminium Foundry FOREMAN required. This appointment carries staff status. Applicants should have served their apprenticeship in pattern making and have foundry experience. Apply with full details of experience, age, salary required. This position has excellent prospects for the right man. Our own staff have been informed of this vacancy. G. PERRY & SONS LTD., Hall Lane, Aylestone, Leicester.

OPPORTUNITY FOR FOUNDRY ENGINEER with a firm of Foundry Consultants. Experience is required in foundry problems in the production of cast iron together with a sound knowledge of melting practice and the metallurgy of cast iron. The applicant will be required to travel in England and the Continent. This position offers a wide scope of interest for an individual, age 25-35 years, with an aggressive approach to problems. Please reply to THE INTERNATIONAL MEEHANITE METAL CO. LTD., 4 Downside, Epsom, Surrey.

FOREMAN DRESSER

A FIRST-CLASS MAN is required as Foreman Dresser in N.E. Coast Steel and Iron Foundry.

Applicants should have previous experience in a similar capacity, and have a good knowledge of ratefixing and dressing shop organisation.

Please write, giving full particulars of age, employment record, salary, etc., to Box FD991, FOUNDRY TRADE JOURNAL.

MIDLANDS. Agency available for Foundry Supplies and Equipment. Foundry experience essential. Box MA501, FOUNDRY TRADE JOURNAL.

TECHNICAL REPRESENTATIVE required by large engineering group to sell iron, steel and stainless steel castings in Cheshire, Lancashire, Westmorland and Cumberland. Please write giving full details of age, experience and salary, to the PERSONNEL OFFICER, SHEEPBRIDGE ALLOY CASTINGS LIMITED, Hamilton Road, Sutton-in-Ashfield.

SENIOR FOUNDRY METALLURGIST capable of controlling grey iron to close limits, required by a Foundry in the Midlands. Applicant should state full particulars of experience, age and salary now being received. Box SF993, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

DRAUGHTSMAN ESTIMATOR/PLANNING ENGINEER with experience of Aluminium and Zinc Pressure Diecasting required by progressive Company in North-West London. Permanent monthly staff appointment and Pension Scheme. Substantial salary to a fully-qualified man. Apply in writing, giving details of education, experience, etc., to the PATENT DIE-CASTINGS CO. LTD., 52 Strode Road, London, N.W.10.

FOUNDRY TECHNICIAN who has completed his National Service required for Grey Iron and Bronze Foundry (Green Sand, CO_2 process and Shell Moulding).

Experience of Sand Control essential. Opportunity to develop Sands section of the Laboratory.

Salary according to experience and qualifications.

Apply PERSONNEL MANAGER, NEWMAN, HENDER & Co. LTD., Woodchester, Stroud, Glos.

MACHINERY WANTED

WANTED.—Cupola 6/8 tons per hour, drop bottom, complete with Fan, second-hand preferred. State Price. Box WC983, FOUNDRY TRADE JOURNAL.

CORE BLOWER, Coleman R2, wanted, secondhand, must be in good condition. State full particulars, price and location. Box CB503, FOUNDRY TRADE JOURNAL.

WANTED. Second-hand Fordath Core Extruder in good condition. Small Shot Blast equipment and combined Shot Blast and De-coring Plant. Second-hand Foundry Stockyard Magnet. Detail size, price, etc., to F.H. (FOUNDRIES) LTD., Pottery Lane, Newcastle upon Tyne, 1.

WANTED. Coleman-Nicholls Stripper; B.M.M. HPL1, HPL2, AT5, moulding machines.
Coleman R4 Coreblower.
Acme No. 2 Core Stove.
Fordath Sand Mixers: 5- and 10-cwt.
Box NS998, FOUNDRY TRADE JOURNAL.

WANTED. Core Blowing Machine, preferably COLEMAN R2 or R4 type, please state price and condition. Box WC997, FOUNDRY TRADE JOURNAL.

400 LB. Oil Fired Tilter wanted by non-ferrous foundry, Central Scotland. Must be in good condition and complete with electrical equipment. Box OF995, FOUNDRY TRADE JOURNAL.

JOLT Squeeze Pin Lift Moulding Machine, preferably complete with BMM, preferred but other makes considered. Box MW987, FOUNDRY TRADE JOURNAL.

NON-FERROUS FOUNDRY

in Midland region requires

DIE FOUNDRY SUPERINTENDENT

to cover both Gravity and Pressure Casting production. Knowledge of hydraulically and pneumatically operated gravity dies essential. Tremendous scope for applicant who can apply himself to the introduction of mechanised production.

Excellent prospects: pension scheme: good salary will be paid to successful applicant. Replies should be addressed to—

Box No. NF500—FOUNDRY TRADE JOURNAL.

Cleveland Plant and Machinery Co., Ltd.,

want your

Surplus Foundry Plant and Forging Equipment

Best prices given

Wharncliffe House
44 Bank Street
Sheffield, 1

MACHINERY WANTED—*contd.*

WANTED—Airless Rotary Shotblast Machine, preferably complete with Dust Extractor. "Centriblast" Rotary Barrel or similar suitable for very small castings. Box WA984, FOUNDRY TRADE JOURNAL.

JOLT Squeeze Pin Lift Moulding Machine. Suitable Boxes 18 × 13. Details SURREY PATTERNS, LTD., Redhill.

150 200 pairs of second hand steel moulding boxes, 16 in. × 16 in. × 3 in. each half (or nearest). Price and details to Box PO962, FOUNDRY TRADE JOURNAL.

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70 K.W. Hackbridge Trailer mounted weatherproof Mercury Arc Rectifier. A.C. 415 volts 3 phase 50 cycles. D.C. 250 volts. Complete Unit, ready for service —WHITEFIELD MACHINERY & PLANT LIMITED, 48 CHATHAM STREET, EDGELEY, STOCKPORT, CHESHIRE.

SAND MILLS, ETC.

PNEULEC 6 ft. dia. with Bucket Elevator, Disintegrator, Skip Loader, 3/50/400V.
DEVEY 5 ft. dia. pan, overdriven.
Laboratory Pan Mill, 17 in. dia. motorised.
"ACME" Sand Dryer, coke-fired.
Electric Sand Dryer, 3 ft. 6 in. × 2 ft. 6 in. × 3 ft. 6 in. high, 3/50/400V.
Disintegrator, double-cage, 3/50/400V.
Gas-fired CORE DRYING STOVE approx. 10 ft. long × 6 ft. × 6 ft., two-compartment.
PNEULEC ROYERS, sizes Nos. 1 and 2.
BLOWING & EXHAUSTING FANS; belt and motor-driven, all sizes.
AIR COMPRESSORS: AIR RECEIVERS: Send all your enquiries for Foundry Plant to:

S. C. B'LSBY & CO.,
Tipton 2448
31, Hainge Road, Tividale, Staffs.
(Established 40 years).

PAN MILLS, 4 ft. and 5 ft. dia. under driven, stationary pans, self discharging, new, for delivery from stock W. & A. E. BREALEY (MACHINERY) LTD. Misterton, nr. Doncaster. Tel. Misterton 202

Large stock of Geared Ladles up to 8-tons capacity.
Several Roper Ladles and Roper Ladle Hoists.
British Moulding Machine size A.T.3.
Morris Screenerator. Nearly new.
MacNab jolt squeeze Moulding Machine, large size.
Pneulec 5 cwt. Capacity Core Sand Mixer, self-discharging motorised A.C.3 phase.
New Bale-out and Lift-out furnaces
Please send for illustrated leaflet
Sinex Knock-out Beam. 5-tons capacity.
August coke-fired core Oven.
Adaptable Moulding Machine.
Jackman Sand Mill, 5ft. diameter.
Four Pneulec Royer sand mixers.
2-ton Dial type crane weigher.
Large stock of Moulding Boxes up to 24in. square. *Please send for list.*

ELECTROGENERATORS LTD.
Australia Road, Slough, Bucks.
Telephone: SLOUGH 22877 and 22094.

MACHINERY FOR SALE—*contd.*

PNEULEC Magnetic Moulding Machine. Suitable for Standard Squeeze Strip Machine for boxes within maximum area 324 sq. in. Type SS. 324. 4½ in. stroke, 3½ in. strip. One 220/240 D.C. vibrator with 10 ft. 3-core cab cable. Solenoid totally enclosed within body of machine.
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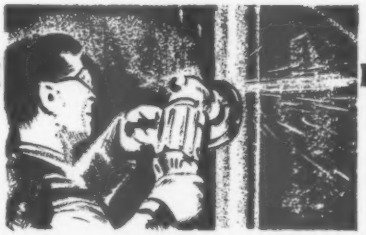

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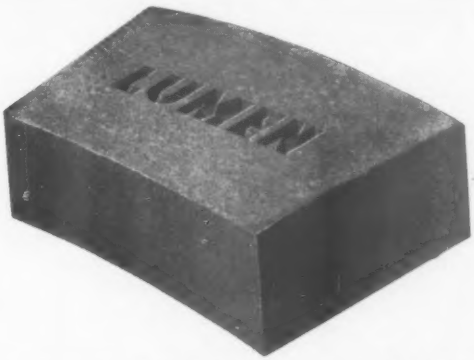

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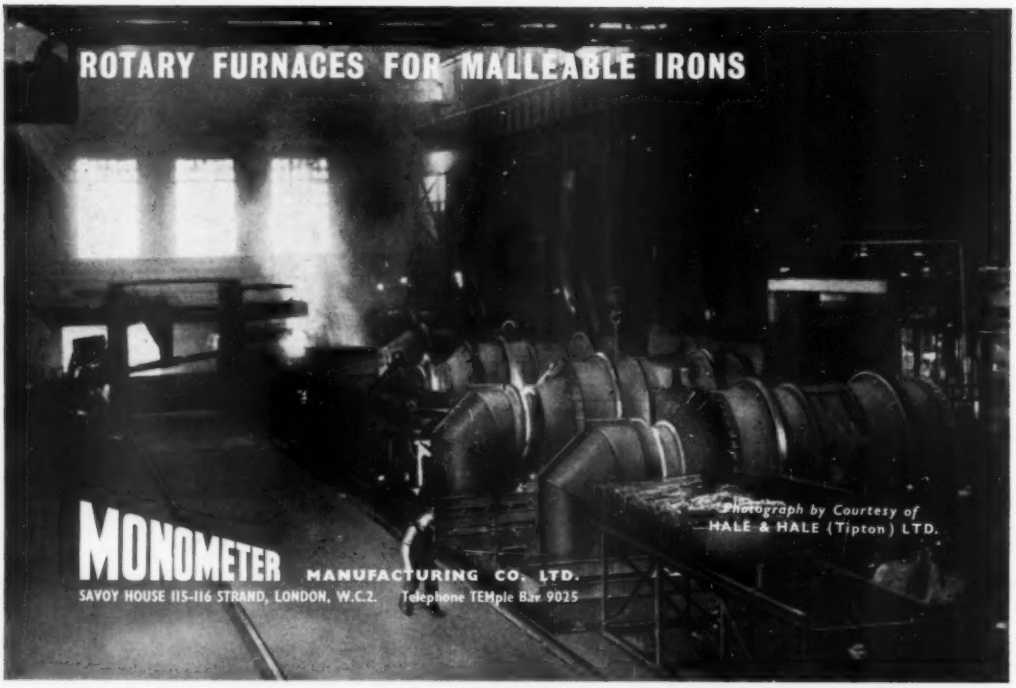
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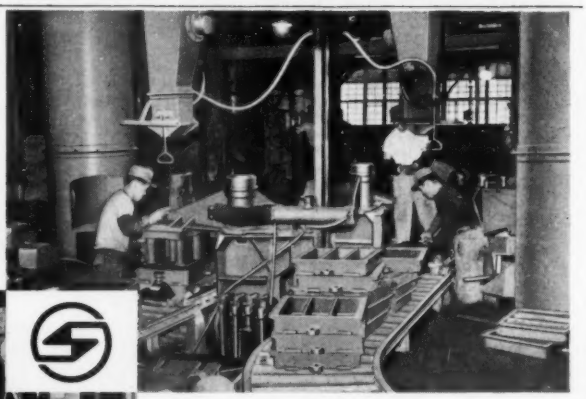

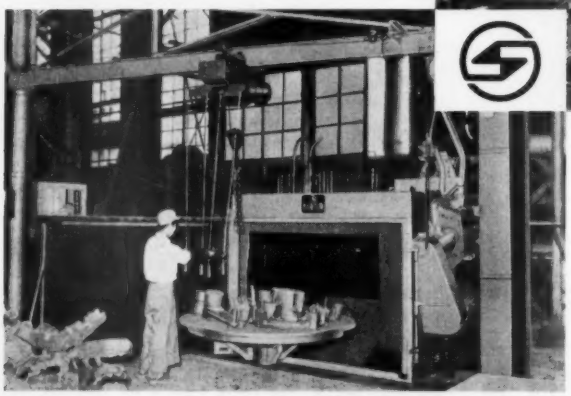

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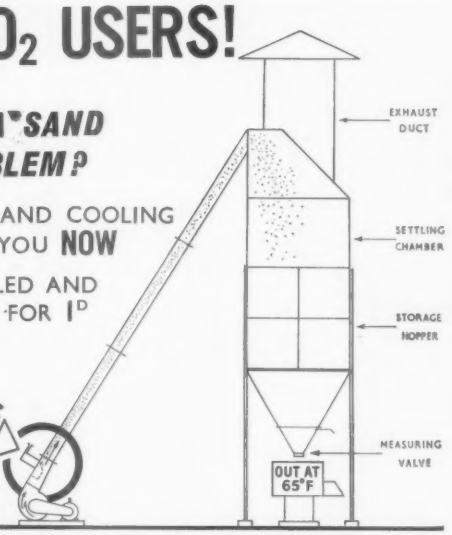

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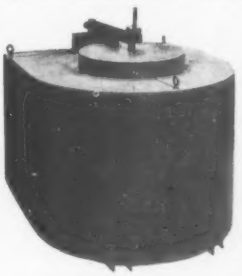

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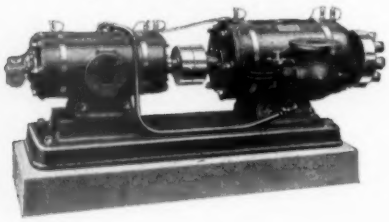

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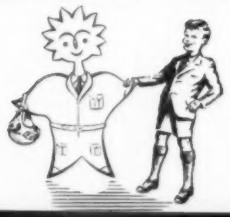

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